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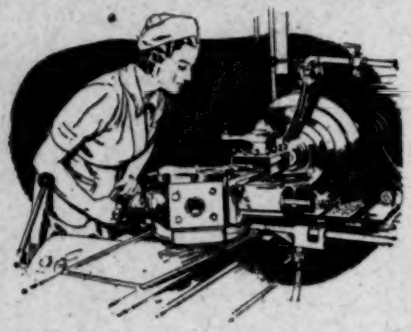

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BRITISH MEDICAL JOURNAL

LONDON SATURDAY JULY 10 1943

THE CIRCULATION IN ARTERIAL HYPERTENSION*

BY

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LECTURE II

In Lecture I it was seen that the circulatory changes which give rise to raised arterial pressure are not quite the same in the various diseases of which hypertension is a symptom.

In one type, of which essential hypertension is the chief example, the hypertension is due to arteriolar constriction; evidence of vasoconstriction has been found in the skin and in the efferent glomerular arteries of the kidney, and in both places it has been shown to be of non-nervous origin. In the skin the vasoconstriction is of an order such that when nervous vasoconstrictor tone is removed the skin blood-flow is, for that circumstance, normal or but slightly reduced. A balance-sheet of the circulation suggests that the vessels to most other tissues except muscle are also constricted; and, although there is no evidence as to the nature of the vasoconstrictor agent in these tissues, it is not likely to be different. So far as we know, coarctation of the aorta and chronic nephritis present a picture similar in its broad features to that of essential hypertension, but, particularly in nephritis, our information is less complete.

The second type is that of acute nephritis in which no vasoconstriction has been demonstrated in the skin of the hand and in which the renal blood-flow may not be reduced. The circulation in pregnancy toxaemia presents certain features which resemble that in acute nephritis, but there is still too little information to judge of its identity.

We may now proceed to consider to what extent these features of the circulation in hypertension can be reproduced by the activity of known pressor mechanisms.

The Vasomotor Nerves

Like most other unexplained disturbances of the circulation, hypertension, and particularly essential hypertension, has been ascribed to abnormal activity, in this case overaction, of the sympathetic nerves. This overactivity, when it has been accounted for, has in its turn been attributed either to a disturbance in the higher functions of the brain acting on the vasomotor centre or to a diminution in the sensitivity of the carotid sinus and depressor reflexes. The first of these hypotheses has never received any substantial proof: the alleged hereditary element in the aetiology of essential hypertension is compatible with it, but also with other hypotheses. The second hypothesis seemed to receive support when it was demonstrated that in the experimental animal a persistent hypertension could be produced by section of both carotid sinus and depressor nerves (Koch, Mies, and Nordmann, 1927). But Pickering, Rothschild, and Kissin were able to show in 1936 that the carotid sinus mechanism is active in essential hypertension, and the tachycardia which is a cardinal feature of the experimental lesion is absent in the supposed human example.

Most of the evidence with which the vasomotor nervous hypothesis of essential hypertension has been supported proves on critical inquiry no more than that the vasomotor nerves are active in patients suffering from the disease, as they are in normal subjects; and although there is a good deal of normal variation in the responses to vasomotor reflexes there is no true evidence of their overactivity in hypertension.

From the evidence presented in the first lecture it is improbable that the vasoconstriction which underlies essential hypertension is of nervous origin; for we saw that the vasoconstriction present in hand and kidney is not of nervous origin. In fact, a review of the circulation in the several diseases revealed only one—acute nephritis—in which overaction of the vasomotor nerves seemed likely; and although Arnott and Kellar (1936) have found that in experimental acute nephritis hypertension is prevented by renal denervation no relevant reflex mechanism has yet been demonstrated.

Adrenaline

Adrenaline, first demonstrated by Oliver and Schäfer in 1894, proved a relatively simple substance, and a good deal is known of its action on the circulation of animals though much less of its action on man. Rein (1931) was, so far as I know, the first to point out that the most important action of adrenaline was that of a redistributor of blood, diverting it from gut and skin to muscle, brain, and heart. This is probably also its chief action in man (see, for example, Grant and Pearson, 1937-8). Thus in an unpublished experiment on myself on Dec. 12, 1936, adrenaline infused into the internal saphenous vein, at the rate of 1.6 c.cm. of a 1 : 100,000 solution per min., reduced heat elimination of one hand from an average of 224 cals. per min. to 35 cals. per min. while increasing the flow through the other forearm from 4.6 to 7.2 c.cm. per min. This dose of adrenaline therefore very considerably decreased blood-flow through skin while increasing it through the whole forearm and therefore through muscle; on another occasion in the same subject the arterial pressure was 120/75 before and 145/65 during infusion at a similar rate. We can, I think, be reasonably sure that adrenaline is not concerned in the genesis of the forms of hypertension considered in the previous lecture; for, although it seems to produce constriction of the efferent arterioles of the kidney, as Smith and his colleagues have shown, its constriction of the skin vessels is much too intense for the active agent in, say, essential hypertension. The simplest demonstration that it is not concerned in essential or chronic nephritic hypertension is one which Kissin and I described in 1936. It is common knowledge that the skin of the face is pink or red in many patients with essential hypertension and in some with chronic nephritis. The absence of constriction in these skin vessels indicates either that there is no excess of adrenaline circulating or that the vessels are insusceptible to it. We were able to exclude the second alternative, for we found that in both these kinds of hypertension the facial skin paled to a normal extent on intravenous injection of small amounts of adrenaline (2 to 2.5 γ).

There is, however, one form of hypertension not yet mentioned in which the presence of abnormal amounts of adrenaline in the circulating blood is the cause of the raised arterial pressure. This is the rare paroxysmal hypertension produced by a pheochromocytoma, a tumour of the adrenal medulla. In this condition occur paroxysms characterized by pallor and coldness of the skin, by hypertension, and in some cases by acute oedema of the lungs; between the attacks the patient is

* An abridged version of the Oliver-Sharpey Lectures delivered before the Royal College of Physicians of London on March 23 and 25, 1943.

normal. A substance which behaves like adrenaline has been demonstrated by Beer, King, and Prinzmetal (1937) in the blood during but not between the attacks; and the paroxysms are abolished by removing the tumour, which often contains excessive amounts of adrenaline. The differences between this and the other forms of hypertension support the view that it is the only one in which adrenaline is concerned; among other differences it is the only form of hypertension in which vasoconstriction affects the digital arteries, as Prinzmetal and Oppenheimer have shown; and it is the only one in which blood taken directly from a patient and perfused through an animal preparation produces vasoconstriction (Beer, King, and Prinzmetal, 1937).

Other Pressor Amines

Several pressor amines have been isolated from tissue undergoing putrefaction (Barger and Walpole, 1909), where they result from decarboxylation of amino-acids. These amines are not known to be present in living tissues, and for this reason are probably not the cause of any hypertension. Little is known of their detailed action on the human circulation, but in animals the action of tyramine bears some resemblance to that of adrenaline (Dale and Dixon, 1909).

Posterior Pituitary Extracts

Pitressin, the pressor fraction of post-pituitary extract, can be dismissed briefly. Theobald (1933-4) has pointed out that it is a feeble pressor substance but a powerful antidiuretic in man. In minute doses it produces intense blanching of the human skin. Its action clearly fails to reproduce the known conditions of the circulation in human hypertension.

Renin

Renin was discovered in 1898 by Tigerstedt and Bergman, who observed a prolonged rise of blood pressure in the rabbit after intravenous injection of saline and other extracts of kidney. They established many properties of the active substance, which they named renin. Unlike adrenaline, renin was to prove a most elusive substance. Despite its discovery only four years after adrenaline and by men no less eminent than Oliver and Schäfer, and despite the clinical relationship between raised arterial pressure and renal disease indicated by Bright, 40 years elapsed before the existence of renin was firmly established. During this interval only Bingel and his co-workers, Strauss and Claus (Bingel and Strauss, 1909; Bingel and Claus, 1910), were able fully to confirm the original observations. The failure to demonstrate renin was not entirely due to neglect. Notable among attempts to demonstrate it were those of Batty Shaw and of Hartwich and Hessel. In 1906 Batty Shaw, in his Goulstonian lectures to this college, described a series of very careful experiments on etherized cats in which he had been able to demonstrate a prolonged pressor effect in some experiments from intravenous injection of saline extracts of fresh kidney. But the results were so irregular—only a fall of pressure being obtained in some instances—that the investigation was not pursued. Nevertheless Batty Shaw had no doubt of the existence of renin, and his views on its possible relationship to hypertension are so like the theory current to-day that they may be quoted: "If a toxic agent leads to the liberation of sufficient renal parenchyma or if a sufficiently large district of renal tissue is newly cut off from the general circulation by extension of occlusive disease . . . the cells involved yield a pressor substance to the system and cause a rise of blood pressure above normal."

In 1932 Hartwich and Hessel, proceeding on the hypothesis advanced by Volhard that pale hypertension was due to a pressor substance of renal origin, obtained a pressor effect from intravenous injection of autolysed but not of fresh renal press-juice; the pressor substance in the autolysate was not renin, however, and was probably one of the putrefactive amines.

Interest in renin received a new stimulus from the demonstration in 1934 by Goldblatt *et al.* that a persistent hypertension could be produced by constricting the renal arteries in the dog. Work by him and by many others succeeded in demonstrating that this hypertension results from the release into the circulation of a pressor substance from the affected kidney. In 1936 Harrison, Blalock, and Mason, and Prinzmetal and Friedman, independently observed that saline extracts made from the ischaemic kidneys of dogs with hypertension produced a greater rise of pressure than did similar extracts of normal kidneys when injected into unanaesthetized dogs; the responses in both instances were peculiar in that they reached a maximum in 20 minutes or more. In 1938 the existence of renin was confirmed independently by workers from many laboratories, and since that date our knowledge of it has grown apace. The question as to why this substance should have eluded detection for 40 years is a fascinating one. It was not because the original account was wrong, for, as Prinzmetal and I showed in 1938, Tigerstedt and Bergman's account of the chemical properties of renin was correct. Depressor and interfering substances are certainly present in saline extracts, but both Tigerstedt and Bergman and Bingel and Claus described methods of removing most of these. Prinzmetal and I suggested that most of the difficulty had arisen from the use of anaesthetized animals as test preparations; for although, as we showed, pressor responses could be obtained in such, they were diminished at least in the rabbit. This has been confirmed by Scarff and Martin (1941), but not in other animals, and needs further work. Another possible reason has emerged from the important work of Kohlstaedt, Helmer, and Page (1938), Page (1939), Page and Helmer (1940a, 1940b), and Braun-Menendez, Fasciolo, Leloir, and Muñoz (1939, 1940), who independently showed that renin is not in itself a pressor substance, but that it is an enzyme acting on a constituent of the plasma globulins (hypertensinogen) to produce a third substance, hypertensin (Braun-Menendez, etc.) or angiotonin (Page and Helmer), which is the effective pressor agent. To produce a pressor response, renin is dependent on the presence of hypertensinogen in the blood.

We may now consider whether renin or hypertensin reproduces the circulatory conditions found in any form of human hypertension; if so, we may consider the substances in greater detail.

Effects of Renin and Hypertensin on the Circulation

Since renin acts through its capacity to produce hypertensin from hypertensinogen, the actions of renin and hypertensin, though differing in duration, should be similar in kind. This seems to be true in the experimental animal, in which intravenous injection of either produces rises of systolic and diastolic pressure which are not due to increased cardiac output and which may be inferred, therefore, to be due to vasoconstriction. This vasoconstriction differs greatly from that of most other known pressor substances in that it does not affect the skin vessels more intensely than those elsewhere in the body. Thus, in the unanaesthetized rabbit, renin in doses which double the arterial pressure produces only the faintest paling of the ear (Pickering and Prinzmetal, 1938) and no fall of skin temperature (Landis, Montgomery, and Sparkman, 1938), effects which are conspicuous with adrenaline and tyramine and posterior pituitary extract. That the ear arterioles do constrict to renin and hypertensin was determined by direct examination of them by Prinzmetal and me (unpublished) and by Abell and Page (1942).

In man the action of renin on the circulation has not been fully investigated because animal renin fails to act on human hypertensinogen and is therefore inactive in man, and human kidneys are a poor source of renin. But hypertensin has been prepared by Helmer and Page in a form suitable for injection into man, and its effects have been investigated by Corcoran, Kohlstaedt, and Page (1941), Bradley and Parker (1941), and Wilkins and Duncan (1941). Hypertensin by intravenous injection or infusion produces a rise in systolic and diastolic pressures, and a slowing of the pulse which is absent or slight in the infusions. The cardiac output is reduced, the heart size is increased, and the venous pressure rises. Corcoran, Kohlstaedt, and Page state that, unlike adrenaline, hypertensin produces no paling of the skin, but Wilkins and Duncan sometimes observed this. No measurements of skin blood-flow have been made with the influence of the vasomotor nerves eliminated, but Wilkins and Duncan tabulate figures for the blood-flow through the hand of the warm subject in 36 experiments in which hypertensin was injected intravenously. In 22 of them

the blood-flow after hypertensin varied between limits above and below the resting; in 8 it was increased and in 6 decreased. Although a final conclusion should await a more deliberately planned experiment, these results suggest that the hypertension produced by hypertensin is not accompanied by any pronounced change in skin blood-flow. The effect of hypertensin on the renal circulation has been investigated by Corcoran, Kohlstaedt, and Page by the methods mentioned in the previous lecture. Hypertensin in doses sufficient to raise the arterial pressure by about 40 mm. Hg reduces the effective renal blood-flow by about 50%, but lowers the glomerular filtration rate to a much less extent—changes which are attributed to efferent glomerular vasoconstriction.

Wilkins and Duncan concluded from their investigations that the changes produced in man by intravenous injection of hypertensin resembled most closely the hypertension of severe acute nephritis in that both may show the manifestations of cardiac failure—i.e., dilatation of the heart and raised venous pressure, features not observed in essential hypertension except in the terminal stages. These changes are, however, precisely the changes induced in a normal heart by a sudden rise of arterial pressure, as Starling showed decisively on the heart–lung preparation 30 years ago. That the heart may behave similarly in acute nephritis and after the injection of hypertensin would thus seem to be due to their both representing the behaviour of a normal heart to an acute hypertension; and the difference in behaviour of the heart in the chronic hypertensions is readily linked with its pronounced hypertrophy in such conditions. So far as we know them, the changes in the peripheral vessels in acute nephritis are not the same as those after injection of hypertensin. Thus as yet there is no evidence of any humoral vasoconstriction in the skin vessels in acute nephritis nor of efferent glomerular constriction, both of which are produced by hypertensin. The absence of efferent glomerular constriction in pregnancy toxaemia again excludes this agent in that condition.

But in essential hypertension, and probably in the other related forms of persistent hypertension mentioned in the first lecture, the chief changes noted in the behaviour of the vessels are similar to those induced by hypertensin, which alone of the known pressor substances is a conceivable causative agent. For although, as Goldring, Chasis, Ranges, and Smith have pointed out, a variety of agents such as adrenaline and tyramine, as well as renin and hypertensin, produce constriction of the efferent glomerular arteries of the kidney, only renin and its product hypertensin produce hypertension without so constricting the vessels of the skin that much blood is diverted from it. So far as our knowledge goes—and it is clearly incomplete—they are the only agents known which reproduce the circulatory conditions of essential hypertension. Since there is thus a prima facie case for the view that the renin–hypertensin system may be concerned in the genesis of essential and related forms of human hypertension, we may proceed to examine it in greater detail.

Renin, as Tigerstedt and Bergman showed, is found in the cortex and not in the medulla of kidney; it has not been obtained from any tissue other than renal cortex. It is present in all mammals and birds examined, but not in cold-blooded vertebrates. Prinzmetal and I found that it is destroyed at 60° C., by strong acids and alkalis, and by alcohol above freezing-point but not at −10° C.; it is non-dialysable, salts out in the globulin protein fraction, and is probably a protein. It is an extremely unstable substance, and Butler and I found it became so progressively when purified. It has not been isolated.

Hypertensinogen, the name given to the substrate on which renin acts, is also a protein, and is found only in plasma. It is also a globulin (Muñoz *et al.*, 1940). Evidence from animal experiments suggests that the liver (Page *et al.*, 1941) and adrenals (Houssay and Dexter, 1942) may be concerned in its production, but the part, if any, played by other organs is obscure.

Hypertensin, the product of the reaction of the foregoing, is a simpler substance than either. It is stable to heat, dialysable, and soluble in alcohol (Page and Helmer, 1940a; Braun-Menendez *et al.*, 1940). It is destroyed by peptic or tryptic digestion, and is therefore thought to be a proteose or polypeptide (Muñoz *et al.*, 1940; Edman *et al.*, 1942).

In a simple mixture of the two renin acts as an enzyme and hypertensinogen as the substrate (Muñoz *et al.*, 1940). That is to say, the amount of hypertensin produced in unlimited time is determined only by the amount of hypertensinogen, and during the reaction hypertensinogen disappears while renin remains. The amount of renin determines only the rate of the reaction. It is obvious, therefore, that the amount of hypertensinogen available is an important factor in determining the intensity of the response to renin, and *in vivo* no response to renin is obtained if the hypertensinogen has been used up (Page, 1939). In the intact animal the amount of renin entering the circulation is also an important factor, for Prinzmetal and I (1938) found the response to renin injected intravenously was proportional to the logarithm of the dose. The intact animal may also be affected by agencies which destroy renin and hypertensin. In 1942 Prinzmetal, Kelsall, and I showed that renin injected intravenously into rabbits could be recovered from the arterial blood after ten minutes but not after an hour, and that the lost renin could not be recovered from the tissues, nor was it destroyed in that time by blood *in vitro*. It is probably slowly destroyed by the tissues, but in a manner at present unknown. Hypertensin is destroyed by an enzyme, hypertensinase, which is most abundant in extracts of kidney and gut, and least in plasma (Houssay and Braun-Menendez, 1942).

Role of the Renin–Hypertensin System

It is probable that the renin–hypertensin system is the effector mechanism in experimental hypertension resulting from renal-artery constriction, for the cumulative efforts of many workers (see Blalock, 1940) have excluded a cause other than chemical, and renin has been demonstrated in the renal-vein blood after renal-artery constriction (see Houssay and Braun-Menendez, 1942). Nevertheless some facts are not easy to reconcile with the hypothesis (Taggart and Drury, 1940; Dock, Shidler, and Moy, 1942), and the chapter is by no means closed. In man there is little direct evidence for the participation of the renin–hypertensin system in hypertension, but the absence of positive evidence does not invalidate the hypothesis. Thus in man it was shown that transfusion of blood from patients with essential or malignant hypertension does not raise the pressure of the recipients (Pickering, 1935-6; Prinzmetal and Friedman, 1936); the same is true in the dog with experimental hypertension (Collins and Hoffbauer, 1937), unless massive cross-transfusions are used (Solandt *et al.*, 1940). The kidneys of patients with benign essential and chronic nephritic hypertension seem to have a renin content no higher than normal (Landis, 1941), but the kidneys of rabbits with chronic hypertension due to renal-artery constriction also have a normal renin content (Pickering, Prinzmetal, and Kelsall, 1942). The crucial test for the presence of renin in the renal-vein blood in man has yet to be performed with the methods successful in the dog.

We may now consider very briefly a further aspect of the hypothesis and inquire whether there is any condition present in essential hypertension which might lead to the liberation of renin from the kidney. Here again the facts are few, and what follows is to be regarded purely as a contribution to a working hypothesis.

The constant presence of renin in the kidney of most mammals examined, and its enzyme-like action on blood, suggest that it performs a definite function in the animal economy. Accepting the interpretation of inulin and diodrast clearances, the chief action of renin or hypertensin on the kidney is to constrict the efferent glomerular arterioles,* and on the circulation to raise arterial pressure without greatly influencing the distribution of blood to organs other than the kidney. Thus we see that the renin–hypertensin system raises intraglomerular pressure by its action both on the renal vessels and on the circulation generally. I would suggest, therefore, that the func-

* Prinzmetal and I (Pickering and Prinzmetal, 1940) found that small doses of renin in the unanaesthetized rabbit reduce urine-flow and the creatinine-clearance rate. With larger doses, well above the threshold for the pressor effect, renin produces a pronounced diuresis, in which the sodium and chloride contents of the urine approximate to those of plasma. The significance of this finding is not yet apparent.

tion of renin is to maintain the head of pressure in the glomeruli on which glomerular filtration, and thus the secretion of urine, depends. This hypothesis is in harmony with the peculiar features of the renin–hypertensin system. Were the effector agent secreted by the kidney near the glomeruli, then under conditions of defective renal blood-flow the renal vessels might receive an undesirably powerful dose of it, leaving little for the vessels elsewhere. But hypertensin is not released until renin has acted on the blood of the general circulation, and so it happens that although the kidney sets the mechanism in motion it receives no more than its due share of the active agent. Goormaghtigh (1939) has suggested that renin originates from afibrillary cells on the afferent glomerular artery close to the glomerulus, and his finding of hypertrophy of such cells in the three weeks following renal-artery constriction is in harmony with the finding of an increased renin content in the first eight days (Pickering *et al.*, 1942).

The hypothesis is also compatible with our knowledge of the mechanisms regulating the arterial pressure. Thus two of the most important organs of the body, the brain and heart, have in close relation to them sensitive vascular areas, the carotid sinus and aortic arch, which are known to play a part in the reflex regulation of the arterial pressure. It is important that both of these organs should at all times receive an adequate supply of blood at suitable pressure, and the advantage of a quickly responding reflex mechanism is obvious. From the circulatory point of view the kidney is also an important organ, since it receives as much as one-third of the cardiac output; but its importance to the organism as a regulator of the internal environment depends more on its action over a long than over a short period of time. A chemical regulating mechanism with a prolonged action is thus highly suitable.

On this hypothesis we should expect renin to be released from the kidney by any change tending to lower intraglomerular pressure. Evidence has been provided that renin is released (*a*) when the arterial pressure is reduced by haemorrhage or histamine (Hamilton and Collins, 1942); (*b*) when a clamp constricts the renal artery (see Houssay and Braun-Menendez, 1942; (*c*) after occluding the renal artery for some hours (Leo, Prinzmetal, and Lewis, 1940). A vasoconstrictor substance which resembles renin in producing tachyphylaxis (Verney and Vogt, 1938) and in having an accentuated action 48 hours after nephrectomy (Govaerts, 1939) is also released from the experimentally perfused kidney.

A Hypothetical Factor

We may ask, then, if any factor is present in essential hypertension that tends to reduce intraglomerular pressure and thus create conditions which, on the above hypothesis, might be favourable to the release of renin. Attention has already been drawn to the frequency of structural changes in the afferent glomerular arteries in essential hypertension. The hypothesis that these represent the causes of the raised arterial pressure is not new, and led Goldblatt to try to produce hypertension by constricting the renal arteries. His success, and in particular his demonstration that by varying the degree of constriction the chief characteristics of either benign or malignant hypertension could be produced, seemed to provide strong evidence in its favour (Goldblatt, 1938a, 1938b). The work of Goldring and his colleagues (1941), discussed in the first lecture, has, however, shown that the chief feature of the circulation in the kidney of essential hypertension is that of increased rather than reduced intraglomerular pressure. The hypothesis need not therefore be abandoned. For the kidney is an aggregation of nephrons, and it is still conceivable that the afferent arteriolar narrowing is sufficiently widespread to release renin in amounts requisite to raise the arterial pressure, while the overall picture of the circulation through the kidney is dominated by the effects of the renin–hypertensin system on the intact nephrons.

Such, then, is a hypothesis concerning the mechanism of essential hypertension. A rather similar hypothesis might be developed for coarctation of the aorta and for chronic nephritis, on which, however, our information is even more fragmentary. In acute nephritis and pregnancy toxaemia hypertension is probably of quite different origin, but beyond this it is not profitable at present to speculate.

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The interesting calculation has been made that the sewage from 5 million people is equivalent to 17,000 tons of rock phosphate in a year. This, as Dr. E. F. Armstrong points out (*Discovery*, March, 1943), happens to be the quantity present in the annual export of meat from New Zealand. According to him the population of Great Britain gets rid in the form of sewage of the equivalent of 150,000 tons of rock phosphate, most of which reaches the sea. The population of the United States rejects into the sea yearly an equivalent of 60 million tons of rock phosphate. Mineral deposits of phosphate are limited in amount and may become exhausted; and many of the agricultural soils of the world are short of them, with a consequent impairment to their crop qualities.

CHEMOTHERAPY OF INTESTINAL INFECTIONS TREATED WITH SULPHONAMIDE COMPOUNDS

BY

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Sulphaguanidine was originally discovered by Buttle in 1938, but little attention was paid to it until the further researches of Marshall *et al.* in 1940 emphasized its solubility yet poor absorption from the gastro-intestinal tract, and thus presented a new principle in the treatment of intestinal infections somewhat analogous to the use of sulphanilamide derivatives as urinary antiseptics. This was confirmed by Roblin and Winnek (1940). It was used with success by Marshall and his colleagues (1941) in the treatment of acute bacillary dysentery in children in the Harriet Lane Home, New York; and Lyon (1941) described his findings in a group of 23 cases, which were compared with a similar number of controls. Subsequently Anderson and Cruickshank (1941) reported the successful treatment of 41 adult cases of Flexner dysentery, which were compared with a series of 55 control cases in the same epidemic. Fairley and Boyd (1942, 1943) published their observations on some 500 cases treated in the Middle East, the bulk of which were Shiga infections, although a number of cases of Flexner, Schmitz, and Sonne infections were also successfully treated. Bulmer and Priest (1942) and Brewer (1943) have also reported their findings in 76 and 77 cases respectively in the same sphere of military operations. Hall (1941) recorded the successful treatment of 20 cases of typhoid fever with sulphaguanidine, while Levi and Willen (1941) reported the successful treatment with sulphaguanidine of a typhoid carrier who had remained positive after cholecystectomy. Canizares and Morris (1941) made a study of 6 patients with proctitis due to lymphogranuloma venereum in whose condition some improvement was effected by means of sulphaguanidine prior to surgical intervention; while Firor and Jonas (1941) suggested that it might be successfully used in chronic ulcerative conditions of the bowel. Firor and Poth (1941) used it pre-operatively to reduce coliform organisms in the large intestine of patients submitted to colonic surgery. Henderson (1943) has recently recorded the excellent results achieved with sulphaguanidine in epidemic gastro-enteritis of the newborn.

Clinical Findings

During 1941 and the first six months of 1942 there were treated in the City Hospital, Aberdeen, 273 cases of bacillary dysentery, all of which were proved bacteriologically. Of these, 140 were given no chemotherapy but saline treatment only, 83 were treated with sulphaguanidine, and 50 were treated with sulphanilamide. Unfortunately, it was not possible to run the three series concurrently. Specimens of stool were examined twice weekly for organisms, and the blood sedimentation rate was taken on admittance to hospital and at the completion of the course in those receiving drug therapy. The cases under review comprise Flexner and Sonne infections, and were, on the whole, of a mild character, with seldom more than 5 or 6 stools a day, some of which contained blood and mucus and others merely mucus, while some were simply loose. All cases showing blood and mucus in the stools were classified as "acute," while those with loose stools were classified as "convalescent carrier cases." Low-grade pyrexia with minor signs of dehydration and occasional vomiting was observed in the 140 cases receiving no chemotherapy. Of 24 who on admission could be described as acutely ill 6 died, two of the deaths being attributable to intercurrent disease. Where necessary, parenteral fluid was given intravenously in the form of 5% glucose-saline, but, so far as was possible, patients were encouraged to take fluid by mouth, the quantity aimed at being 8 to 10 pints in 24 hours for adults and proportionately less for children. Throughout, the customary general nursing measures were employed.

Dosage

Sulphaguanidine.—The dosage used was an initial loading dose of 0.5 g. per kilo of body weight for the first 24 hours, followed by a maintenance dose of 0.1 g. for the next 4 days. The tablets were powdered, and were administered in milk 4-hourly for the first 24 hours and thereafter 3 times daily for 4 days.

Sulphanilamide.—The following doses were given 4-hourly for the first 4 days and 3 times daily for a further 4 days, each tablet containing 0.5 g.:

0–3 months	¼ tablet
3 months–2 years	½ „
2–5 years	½ „
5–10 „	1 „
10–15 „	1½ tablets
Over 15 years	2 „

No Chemotherapy.—Adult patients were given 2 drachms of sodium sulphate night and morning, and child patients 1 drachm night and morning.

At the end of the first 24 hours the drug content in faeces and blood was estimated and the blood sedimentation rate was also determined. Similarly, when a patient became bacteriologically negative the blood sedimentation rate was again taken. Specimens of stool were examined twice weekly until three consecutive negative results were obtained. In no case were rectal swabs taken; nor were the faeces mixed before obtaining specimens, these being taken purely at random.

Analysis of Flexner Cases

Flexner Cases treated with Sulphaguanidine.—Forty-seven cases were treated; the average duration of stay in hospital was 13.4 days and the average number of days before becoming bacteriologically negative was 6.6. These were subdivided into 13 acute cases and 34 convalescent carriers.

Flexner Cases treated with Sulphanilamide.—Twenty-one cases were treated; the average duration of stay in hospital was 30.4 days and the average number of days before becoming bacteriologically negative was 20.9. Eleven cases were regarded as acute and 10 as convalescent carriers.

Flexner Cases—No Chemotherapy.—Eighty-three cases were treated without chemotherapy; the average duration of stay in hospital was 22.7 days, while the average number of days before becoming bacteriologically negative was 13.3. These were subdivided into 63 acute cases and 20 convalescent carriers.

Analysis of Sonne Cases

Sonne Cases treated with Sulphaguanidine.—Thirty-six cases were treated; the average duration of stay in hospital was 17.1 days and the average number of days before becoming bacteriologically negative was 10.3. These were divided into 16 acute cases and 20 convalescent carriers.

Comparative Results of Chemotherapy

Treatment		Flexner			Sonne		
		Acute	Conv. Carr.	All Cases	Acute	Conv. Carr.	All Cases
Sulphaguanidine	No. of cases ..	13	34	47	16	20	36
	Average days in hospital ..	12	13·9	13·4	12·1	21	17·1
	Average days bacteriologically positive ..	4·6	7·4	6·6	5·9	14·3	10·3
Sulphanilamide	No. of cases ..	11	10	21	9	20	29
	Average days in hospital ..	28·8	32·2	30·4	26·1	22·8	23·8
	Average days bacteriologically positive ..	19	23·1	20·9	16·3	13·4	13·9
No chemotherapy	No. of cases ..	63	20	83	18	39	57
	Average days in hospital ..	23·4	20·5	22·7	19·4	18·8	19
	Average days bacteriologically positive ..	14	10·5	13·3	9·9	9·4	9·5

Sonne Cases treated with Sulphanilamide.—Twenty-nine cases were treated; the average duration of stay in hospital was 23.8 days, while the average number of days before becoming bacteriologically negative was 13.9. These cases were divided into 9 acute cases and 20 convalescent carriers.

Sonne Cases—No Chemotherapy.—Fifty-seven cases were treated; the average duration of stay in hospital was 19 days, while the average number of days before becoming bacteriologically negative was 9.5. These were divided into 18 acute cases and 39 convalescent carriers.

Biochemical Findings

Sulphaguanidine.—Blood concentrations usually varied from 3 mg. per 100 c.cm. to a trace, but in one case 9 mg. was found, in 2 cases 8 mg., in 1 case 7 mg., and in one other case 6 mg. per 100 c.cm. The concentration in faeces varied from a trace to as high as 10,000 mg. per 100 c.cm. At the beginning of the series leucocyte counts were done as a routine in each case, but as these were invariably normal this examination was discontinued.

Sulphanilamide.—Blood concentrations were lower than in the case of sulphaguanidine-treated cases, the highest concentration in the blood being 3.3 mg. and the lowest 0.1 mg. per 100 c.cm. In the main they varied between 1 and 2 mg. Concentrations in the faeces varied between a trace and 840 mg. per 100 c.cm., the average being between 300 and 400 mg.

Toxicity of Drugs

In no case treated with either sulphaguanidine or sulphanilamide was any evidence of toxicity observed, judged by the standards of nausea, cyanosis, vomiting, pyrexia, rash, or haematuria. The urine was examined every second day for blood and albumin, but this practice was later reduced to twice weekly on account of lack of toxic symptoms. Older patients were also questioned with regard to any disagreeable effects, but these were remarkable by their absence.

Gastro-enteritis in Infants

Four cases were treated with sulphaguanidine; 3 of these patients died without any improvement in the stools or in the general condition. All were male babies, varying in age from 1 to 2 months and presenting varying degrees of dehydration, with frequent loose, green, and offensive stools from which no specific organism was obtained. The dosage used was 3 g. during the first 24 hours as a loading dose, followed by 2 g. daily for 4 days, but in none of the cases did the concentration in the blood exceed 0.8 mg. per 100 c.cm., although the concentration in the faeces went as high as 25,000 mg. We can only conclude that the dehydration and the frequency of the stools were so pronounced that the drug had no time to be absorbed and was passed rapidly through the intestines.

Paratyphoid B Fever

Eight cases treated with sulphaguanidine were taken, varying in age from 3 months to 53 years. Sulphaguanidine had no effect on the stools, which remained positive throughout the course and for a considerable time afterwards, although in two cases a distinct improvement in clinical condition was noted. These patients were exceedingly listless, with marked lose of appetite, but within 48 hours of starting treatment with sulphaguanidine their general condition had greatly improved. The dosage varied from 5.25 g. daily for 6 days to a maximum of 10.5 g. daily for 14 days.

Summary

273 cases of bacillary dysentery treated in the City (Infectious Diseases) Hospital, Aberdeen, during 1941-2 are described, together with 4 cases of gastro-enteritis of infants and 8 cases of paratyphoid B fever. Of the cases of bacillary dysentery 140 received no drug, 83 were treated with sulphaguanidine, and 50 had sulphanilamide.

The series receiving no chemotherapy were given 2 drachms of sodium sulphate night and morning for an adult and 1 drachm night and morning for a child. Those receiving sulphaguanidine were given a 5-day course based on body weight, the initial loading dose during the first 24 hours being 0.5 g. per kilo of body weight, followed by a maintenance dose of 0.1 g. per kilo for the next 4 days. Those receiving sulphanilamide were given a dosage amounting to half the quantity of sulphaguanidine.

The tablets were powdered and administered in milk 4-hourly for the first 24 hours and 3 times daily for the next 4 days. Parenteral fluids were given intravenously in the form of 5% glucose-saline where necessary, and particular stress was laid on fluid intake by mouth—8 to 10 pints for adults and proportionately less for children.

The stay in hospital and the number of days during which the stools remained positive were reduced by half in the sulphaguanidine-treated cases as compared with those receiving no chemotherapy, except in the case of Sonne convalescent carriers, in which both the stay in hospital and the number of days bacteriologically positive were slightly increased. In the sulphanilamide-treated cases both the stay in hospital and the length of time during which stools remained positive were increased, but this may be accounted for by the small dosage of drug and by the small number of cases treated.

Neither sulphaguanidine nor sulphanilamide produced any toxic symptoms or disagreeable effects.

4 cases of gastro-enteritis and 8 cases of paratyphoid B were treated with sulphaguanidine without any improvement.

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TECHNIQUE OF INTRAVENOUS DRIP TRANSFUSION IN INFANTS

BY

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The technique of intravenous drip transfusion, or venoclysis, was first applied to the treatment of infants about ten years ago, since when it has established itself as the most effective method of combating severe dehydration due to infantile diarrhoea and vomiting or for the post-operative administration of fluids in babies and small children. But it is much more difficult to carry out than in adults, has more risks, and provides an arduous task for the nursing staff, on whose energies and competence the success of the method chiefly depends. Unfortunately, owing to the frequency with which things can go wrong, it is apt to be regarded as a method that demands a party of experts to run it. It is true there is a real danger of overloading the system with fluid, and judgment in this matter requires experience; but it is as often as not the accumulation of small faults and mishaps, rather than more serious ones, that determines the success or failure of the undertaking. The object of this paper is to discuss the causes of failure and their remedy and to put forward some general principles for running continuous intravenous transfusions in infants with efficiency and safety.

The Technique Normally Adopted

The anterior saphenous vein at the ankle is chosen, as it is very constant in position and has definite surface markings. It lies on the anterior surface of the tibia, running upwards and slightly backwards midway between the tendon of tibialis anticus and the internal malleolus of the tibia, both of which can be felt. It is often visible in thin babies or may be made to stand out, and it is plainly visible in most adults, in whom its position and course may be easily examined.

The diameter of this vein in a 3-months-old baby is between 1 and 2 mm., and although it will stretch to slightly more than this it is difficult to insert a cannula into it of greater thickness than 2 mm. Various types of cannula are used to meet the case, such as a large-sized hypodermic needle with the bevel

cut off, a ureteric catheter (Wilmers, 1938), a hypodermic needle covered by a closely fitting length of ureteric catheter, a small-sized Hamilton Bailey needle, or the needle specially designed for the purpose by Bateman, with an inner cannula which can be removed and cleaned should it become blocked.

The foot and leg are firmly fixed by strapping to a padded splint applied to the outer side of the leg. The foot is fixed in a position of slight plantar flexion (Fig. 1). The skin between the internal malleolus and the tendon of tibialis anticus is anaesthetized with local anaesthetic: 0.5 c.cm. of 1% novocain is usually enough for this, but another 0.5 c.cm. may be injected more deeply. A transverse incision about half an inch long is then made at right angles to the axis of the vein at the level of the internal malleolus. The vein, which may be difficult to see if there is much oozing, is identified by its bluish or pinkish colour, and is dissected free from its fascia so that two ligatures, about a quarter of an inch apart, can be passed under it. The distal ligature is tied immediately.

The vein is opened by an oblique or transverse scissor-cut, as in the technique for adults, and the cannula inserted and tied in with the proximal ligature. Obviously in such a tenuous vessel some care is required to cut a hole big enough to admit the cannula and yet not snip the vein clean in half. It is this, and finding the vein, that constitute the chief difficulty of the operation.

One c.cm. of normal saline should now be injected through the cannula. If the latter is in the vein the saline will go in with the lightest pressure on the plunger; but if it is in the sheath of the vein, or in the soft tissues or some fascial tissue that was mistaken for a vein, pressure will be required and a lump will appear under the skin. All being well, the incision is closed by one stitch, and the tubing carrying the transfusing fluid from the vacoliter is connected to the cannula by a well-fitting adapter nozzle and secured in position by strapping; the flow of fluid is then started, the rate being controlled by a screw clamp and drip connexion.

Some Dangers, Difficulties, and Mistakes

1. *Severe or Fatal Collapse at the Start.*—An intravenous drip should never be regarded as an emergency. It may be very urgent and a life-saving measure in an acutely dehydrated infant, but often in such cases a condition analogous to shock is present, due to anhydraemia and toxaemia, and the process of setting up the drip, however skilfully done, may be more than the infant can stand. There is no case that will not be better off in these circumstances by being given a hot bath, put into a warmed bed, and left severely alone for one or two hours. At the end of this time it will probably be able to stand such intervention as is necessary to start the transfusion.

2. *Excessive Time Spent in Setting up the Drip, with Consequent Exhaustion of the Infant and Deterioration of its General Condition.*—The baby may be relieved of much strain by dividing the whole process into three stages. When it is decided to give an intravenous drip (i.e., on admission or when examining the infant in the ward) a time should be chosen which suits the ward and the doctor (within a few hours, of course; there is never more urgency than this); but the preliminaries of splinting, cleaning, and tying the limb should be carried out forthwith. The baby is then left in peace for an hour or more, and may get to sleep in the ensuing interval until the time of the operation. When that time comes it is rested, and part of the procedure is already completed.

In the second stage the instruments, vacoliter, etc., which have been prepared are brought to the very last degree of readiness at the bedside, *the infant as yet being completely undisturbed.* The vacoliter must be suspended, tubing filled and saline dripping from the cannula, aneurysm needle threaded, stitch ready, and small strips of strapping available for fixing the cannula and tubing in position. The tightness of the adapter fittings must be tested, also the points of the scissors. To insert the cannula it is necessary to cut half-way through a vein which may be only 1 mm. thick, so it is important to make sure that the tips of the scissors will do their job.

In the third stage the bedclothes are gently lifted back, exposing the limb all ready, and the dissection of the vein is begun. When quickly and neatly done the baby suffers very little fatigue, and may even sleep through it. But if the three stages described are made one procedure and there are any minor mishaps or delays, as there often are, the total time spent on the job is much longer for the baby, and in the end an hour or more may elapse before it is once again left in peace. By this time it may be very exhausted.

As to the actual dissection of the vein, only practice can bring speed, but it is worth while for the inexperienced to note that the vein is more easily seen when a local anaesthetic is injected into and deep to the subcutaneous tissue, as its blueness then contrasts with the pale injected tissues and oozing is diminished. About 1 c.cm. of 1% novocain in all may be used. If the subcutaneous tissue is widely split at right angles to the incision by opening the points of the scissors, it can be identified at once, but it is less and less easily discerned when the tissues become blood-stained from frequent swabbing and tentative probing. In plump babies there need be no fear of severing the vein in cutting through subcutaneous tissue, as it lies well down on the deep fascia. It is easier to insert the cannula into very small veins if the stylet is in, as this projects beyond the end of the cannula and, being smaller, can be got into the vein first; the cannula can then be slid along the stylet till it also lies in the vein.

3. *Venous Spasm.*—It is not uncommon for the drip to stop immediately after it is set up or to run excessively slowly at the start. Attempts to correct it there and then only lengthen the time of the whole operation and add to the exhaustion of the child. The temptation to continue manipulations with or syringing through the cannula must be resisted. If the limb is warmed up by hot-water bottles and the whole thing left alone, the drip will nearly always start spontaneously and speed up by itself. Relaxation of venous spasm may be the reason.

4. *Clotting.*—A double cannula, of which Bateman's needle (Field *et al.*, 1943) is an example, is the only safeguard against this fault. If the inner cannula becomes blocked it can be thoroughly cleaned and replaced without trouble. It is therefore essential to get an outer cannula into the vein first: it may be a tight fit, but it can be done in all but the very smallest veins. One of the causes of clotting has its origin at the time of setting up the drip. Thus, when the outer cannula is inserted into the vein blood may flow back along it. If there is any delay in starting the flow of saline this blood will begin to clot; then when the inner cannula is inserted through this clot a small plug will block the end of it. Although this plug may be driven out at once, any particle remaining will form the starting-point of a firmer clot later on. *Therefore a stylet should always be placed in either cannula when saline is not flowing through it even for a few minutes,* and the stylet should be in the outer cannula at the time it is introduced.

5. *Splinting the Limb.*—Nearly all other troubles—for example, irregular dripping, leaking, damage to vein, etc., mentioned below—are due to the limb not being properly immobilized or the fixation of the cannula and tubing being insecure. Splints of several sizes must be available. When an ankle vein is used the splint should project well beyond the foot and should have little padding. The foot must be fastened to it most firmly with strapping next the skin. Elastoplast will not do, and a heavily upholstered splint or the limb swathed in cotton-wool and bandages is worse than useless. When properly set up, the splint, leg, cannula, tubing, and dressing, held together by as many strips of strapping as required, form one firm structure. The baby can wave its leg about or be taken out of bed for nursing *or lie on either*

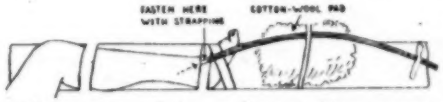

FIG. 1.—Right way. Long splint; tubing supported and approaching the cannula at the right angle, without flexion.

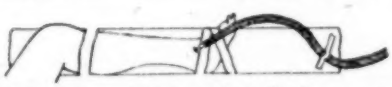

FIG. 2.—Wrong way. Short splint; flexion on tubing, with spring-like strain transmitted to vein.

side—a great advantage, for it sleeps much better on its side. The most important thing is that the splints should be long enough to project 8 to 12 in. beyond the foot, so that the tubing leading to the cannula in the vein may be fastened at the far end of the splint and then have a straight run up towards the vein (Fig. 1). If it is fastened close to the foot the tubing will have flexion on it, the spring-like action of which will be transmitted to the cannula in the vein, and the strain on the wall of the vein may be considerable (Fig. 2). A pad of cotton-wool should support the weight of the tubing and give it the natural curve required to bring it nicely to the vein (Fig. 1). Sometimes the tubing is left unfastened in the most haphazard way, in which case it waggles to and fro and may tear the vein, so that the transfusion becomes a continuous subcutaneous, not an intravenous, drip. The rate of flow varies considerably if the cannula is loosely held in position, as any movement of the foot or tubing may cause it to kink the vein. Also, the endothelium may be damaged and thrombosis occur. A small stitch, through skin only, just distal to the incision, may be used to *tie the cannula in position, and is very effective in preventing any lateral or pulling and pushing movement of the cannula in the vein.* When the foot is really securely held the baby feels no pain and does not want to move it. But when things are loose its wriggling causes pain and it tries to work the foot looser still. Leaking may then occur between the adapter nozzle and the cannula. This is another cause of irregularity in the rate of the drip, and the discrepancy between the recorded amount run in and the amount the child has really received may be serious. The arm is much easier to control, and for this reason drips in the antecubital veins generally run smoother and longer than others. But these veins may be difficult to find in fat babies unless they can be seen.

The cephalic vein at the wrist, which corresponds anatomically to the anterior saphenous at the ankle, is serviceable in all but the tiniest babies. It runs midway between the styloid process of the radius and the tendon of extensor carpi radialis. The hand should be splinted palm downwards.

Complications

Sepsis should never occur; but it does. The frequency of its occurrence is directly proportional to the amount of interference there has been in the course of the continuous drip. The case that runs smoothly, for several days even, hardly ever gets infected. But when the dressing is frequently lifted and many readjustments are made infection is apt to creep in. Thrombophlebitis is common but very rarely proceeds to suppuration. An abscess sometimes forms, a week or more later, half-way up the calf. A low-grade infection of the incision is quite common. These complications respond well to appropriate measures, but, occurring in infants who are already much debilitated, should always be regarded seriously. Their prevention is embodied in the measures described for promoting smoother running of the drip.

Oedema.—Local oedema may be due to the strapping being too tight above the site of transfusion, to the drip being too fast, to tearing or thrombosis of the vein; or it may be the first sign of a developing general oedema. General oedema may be due to too much fluid, too much sodium, hypoproteinaemia, nephritis, sclerema, anaemia, vitamin B deficiency, or circulatory failure. Eucortone may also cause it (Ferrebee *et al.*, 1939). With the exception of too much fluid, it is extremely difficult to distinguish clinically between these various causes of general oedema. In any case of general oedema or pulmonary oedema the drip must of course be discontinued at once.

Bronchopneumonia.—This is still regarded as the most serious and most frequent complication of gastro-enteritis, and the blame is often laid on the continuous intravenous drip. But it must be borne in mind that the majority of cases of infantile diarrhoea and vomiting are due to upper respiratory tract infection, and the infecting organisms may show various propensities for invading the lungs and bronchi in different epidemics and different seasons, regardless of whether continuous drips are given or not. However, there is no doubt that nursing a baby for long periods on its back or maintaining a high salt content in the transfusing fluid does favour pulmonary stasis and oedema, leading to infection, whereas nursing it on its side and with moderate salt content in the fluid does not.

Petechial Rashes.—These occasionally occur in the later stages in cases of gastro-enteritis that have been given several intravenous drips. They begin as very fine speckled petechiae, chiefly on the trunk, and may develop into ecchymoses or large haemorrhagic taches. They are presumably due to capillary damage. The nature of this is uncertain, but it is not scorbutic, as vitamin C does not prevent it or cure it; nor is it likely to be "toxic," as these rashes do not occur at the most toxic stage of the illness, which is usually the beginning. The probable explanation is the strain imposed on the capillary endothelium by the frequent disturbances of blood volume and alterations in blood chemistry occurring during repeated transfusions. The prognostic significance is not as grave as that of haemorrhagic rashes in general infections, but the outlook is usually very bad for other reasons.

Control over Fluid Input

It has already been mentioned that giving too much fluid constitutes a major risk in the application of the technique of intravenous transfusions to infants. The following general rules provide a reliable safeguard against this danger and will be found to make for good results.

1. The approximate quantity of fluid required in 24 hours must be calculated in advance and put down in writing together with the child's weight as a check for all to see.*

2. The rate at which this fluid is to be given must be expressed not as drops per minute but as ounces (or cubic centimetres) per hour. This needs special emphasis, for the size of a drop varies with the speed at which it falls and the shape of the dropper; also, the rate of dripping is apt to vary while the observer's back is turned, and a period of slow or rapid dripping may go unrecorded. Therefore even if specially calibrated droppers are used it is impossible by this means to foretell how much fluid will be delivered over a given period of time; the rate of the drip is much too variable. The nurse who is controlling the drip must find by trial and error the approximate rate which will deliver a given amount per hour, and periodically adjust it according to her own judgment to keep the input per hour within such limits.

3. There must be reasonably accurate and reasonably punctual hourly recording of the amount run in. An exceptionally large or small input in one hour can then be corrected in the next.

4. The amounts per hour should be added up as the day goes on; it is then easy to see how far the total for the 24 hours is going to exceed or fall short of the required amount, and adjustment of the hourly quantity can be made accordingly. Fluids by mouth must of course be included in the reckoning.† It is more practical to express intravenous fluid in ounces than in cubic centimetres, as this is the unit by which a baby's fluid intake is normally measured and a unit with which all nurses are familiar. The reading of these hourly quantities on the scale is easier and more accurate if the vacoliter or flask is tall and of small diameter. The Baxter type is not very suitable. In practice it will be found that measurement to within a quarter of an ounce is quite easy on the E.M.S. transfusion bottle, and it is not necessary to try to be more accurate than this.

5. *Strength of Saline to be Used.*—It is now widely accepted that the continuous transfusion of normal saline carries with it the danger of producing hydraemia and oedema, as the infant's powers of excreting surplus sodium chloride are limited. Solutions of approximately half-normal saline, on the other hand, are adequate for replacing lost base in any case of diarrhoea and vomiting, and have not this danger of overloading the body fluids with salt.

6. *Occasions for Extra Caution.*—(i) When any degree of circulatory failure is present much greater caution must be used if overloading the heart is to be avoided. (ii) Babies with "toxaemia," whether it be from "alimentary intoxication," pneumonia, otitis media, or any other infection, have difficulty in retaining fluid given parenterally and in adjusting the balance between intracellular and interstitial fluid. They are liable to remain in a state of chronic dehydration even when given full quantities to cover fluid loss. By contrast the non-toxic dehydrated baby—for example, a case requiring fluid after operation or a pyloric stenosis—when given correct amounts will adjust its fluid balance with ease. If the infection can be overcome the same may be expected of the "toxic" baby; but pushing fluids or attempting to adjust blood chloride levels, etc., by varying strengths of saline is unlikely to achieve anything so long as this persists.

* The actual quantities and rates of transfusion, according to weight of baby, are discussed by Field *et al.* (1943).

† All these points are embodied in the daily fluid chart advocated by Field *et al.* (1943).

Conclusion

Nothing perhaps requires greater emphasis in this paper than that all these points concerning technique should be thoroughly understood by the nursing staff. Some of them may seem trivial, but it is only by constant attention to these details that this method of continuous intravenous drip transfusion will consistently give the good results which are justly claimed for it.

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TRIGEMINAL NEURALGIA AT AN EXCEPTIONALLY EARLY AGE: CURED BY GASSERIAN ALCOHOL INJECTION

BY

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Paroxysmal trigeminal neuralgia—or, better, trigeminal tic—is usually a disease of the latter half of life, four-fifths of all cases starting within the three decades 41–70 and more than one-third in the decade 51–60. Yet occasionally young people are attacked, for I have had more than twenty patients who began to suffer before the age of 21—two of them at the age of 12. The earliest hitherto recorded case in my knowledge is that of a boy aged 10 operated on by Mr. Barclay (1922) of Newcastle.

Case History

I have now to record the case of a girl who had been suffering since the age of 16 months from frequently repeated daily spasms of pain, lasting a few seconds only, and referred to the left lower jaw up to the ear. She was a Caesarean baby, weighing 9 lb. at delivery, and between the ages of 4 and 5 months had won no fewer than four prizes at baby shows. Yet her dentition did not start until she was 12 months old, and from the age of 16 months she began to have obvious pains with her teeth, paroxysms of a few seconds' duration occurring frequently during the day, and often waking her, screaming, at night. At first the neuralgic attacks seemed to affect both sides, until she completed her milk dentition at the age of 3 years—a year later than the average. Since then the attacks have been definitely limited to the left side, being referred along the lower jaw to the ear, and lasting a few seconds only.

She was first brought to me on July 3, 1942, when less than 4½ years old, and on several occasions I witnessed the sudden attacks of pain, lasting only from a few seconds to a quarter of a minute, the child immediately afterwards becoming quite normal in behaviour. Radiographs of the mandible showed no bone or dental abnormality. She had previously been treated at Great Ormond Street Hospital, and drugs seemed to have no influence on the neuralgic spasms, so I decided on alcohol injection of the foramen ovale. This I attempted on Aug. 21 under preliminary rectal paraldehyde and then ethyl chloride inhalation. No co-operation with the little patient was possible by such a method, and the result was not good: anaesthesia of the third division was slight, if any, and freedom from pain lasted only a couple of days. Three other attempts were made under general anaesthesia in September and November, using the lateral route, without obtaining lasting trigeminal anaesthesia, though after the injection on Nov. 18 she had very few attacks of pain for ten days, then relapsing as before. On Dec. 9 I again injected under a general anaesthetic, using the anterior route in front of the coronoid process, and this time produced complete left trigeminal anaesthesia, after injecting 8 minims of 90% alcohol into the Gasserian ganglion. The neuralgic spasms died away within two days, and she has had no further signs of neuralgia up to the present time—seven months after the injection—though some keratitis developed during the last week of December, with some temporary loss of the superficial corneal epithelium. She was taken into Maida Vale Hospital at once, and the keratitis cleared up completely under treatment, and the cornea now shows no sign of opacity or scar. With the exception of a mild attack of German measles while being treated for the keratitis she has remained perfectly well, and, though the trigeminal anaesthesia persists unaltered, the child does not appear to take notice of it, and is quite merry and bright.

Comment

As regards the prognosis, it is quite probable that the cure will be permanent, as I have found in numerous other similar cases in adults. There is a possibility of recurrence of neuralgia on the other side, for I have met with bilateral trigeminal tic in at least 100 cases, and its incidence, in my experience, seems to be between 4 and 5% of the total cases seen. Sometimes the neuralgia appears on both sides within the period of a week, but more often there is an interval of several years. One of my patients, a lady of 64 when I first saw her eighteen years ago, had suffered since the age of 12 with typical neuralgic tic on the right side of the face—that is, for 52 years. Gasserian injection cured that pain completely; but fifteen years later, when she was 79, similar neuralgia attacked the left side, and I had to inject the left Gasserian ganglion also, thus numbing both sides of her face completely. Sixty-seven years therefore separated the onset of the neuralgia on the two sides. The left motor root had recovered after the first Gasserian injection, as is usually the case, and therefore she had no jaw-drop after the second Gasserian injection.

The probability of bilateral pain probably increases with the length of duration of the disease, so that in the case of the child described above, whose pain was at first bilateral, there is a distinct possibility that the pain may recur at some future date on the right side.

As regards the aetiology of trigeminal tic, it is usually stated in medical and neurological textbooks that the cause is unknown. I have for many years been convinced that the cause is an infective neuritis of the trigeminal-nerve endings in the maxilla or mandible, in the large majority of dental origin, though occasionally secondary to antral infection. This view I have consistently taught, and have published on various occasions, with my reasons for this belief (Harris, 1926, 1937, 1940).

In the case of this little child, otherwise very healthy and not in the least degree of neurotic type, the acute onset of the neuralgia with commencement of her teething is most suggestive evidence of the close connexion between dental disturbances and the origin of trigeminal tic.

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THE AVAILABILITY OF THE CALCIUM OF MILK

BY

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AND

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The experiment reported here was carried out in response to criticism of our experiments published in this *Journal* (Coward, Kassner, and Waller, 1938). In the early experiments we had shown that rats fed on a diet resembling that of a poorer-class population and supplemented by liberal doses of cod-liver oil failed to produce normal calcification of the bones, but that the calcification was improved in proportion to the supplementary doses of a mixture of calcium and phosphate salts given. In fact, the highest dose of salt mixture produced as high a percentage of ash as did a supply of milk *ad lib.* each day. It was not, however, from a comparison of results of these apparently excessive doses that we drew our conclusion of the relative availability of calcium from milk and from salts, but from the result of giving only 5 ml. of milk to one of the groups of rats. Unfortunately we had not determined the calcium content of the milk given, for this comparison was not the purpose of the experiment. Judging by the percentage of ash found in the bones, however, the milk apparently contained only 0.76 g. of calcium per litre. Since the average calcium content of cow's milk is 1.12 g. per litre, we thought it very unlikely that the sample we used could

Table summarizing Effects of giving Extra Calcium (a) as Milk, (b) as Inorganic Salts, on Increase in Weight, Weight of Dry Fat-free Bone, Weight of Ash in Bone, and Percentage Ash of Bone in Rats fed on a Diet similar to that of the Poorer Classes

Group	Supplement	Total Calcium Intake* per Day (mg.)	Average Increase in Weight in 5 Weeks (g.)		Average Weight in Dry Fat-free Bone (g.)		Average Weight of Ash (g.)		Average % Ash in Dry Fat-free Bone	
			♂	♀	H.	F.	H.	F.	H.	F.
1	0·02 g. salt mixture ..	7·95	54·75	46·75	0·05520	0·10329	0·02458	0·04590	44·48	44·44
2	0·04 " " ..	9·90	57·00	57·25	0·06046	0·11599	0·02913	0·05525	48·15	47·60
3	0·08 " " ..	13·80	54·75	49·00	0·06466	0·12139	0·03291	0·06195	50·94	51·04
4	3 ml. milk	9·60	66·75	60·75	0·06023	0·11555	0·02833	0·05430	46·98	46·96
5	6 " "	13·20	79·75	66·75	0·06890	0·13819	0·03350	0·06546	48·72	47·49
6	9 " "	16·80	91·00	75·00	0·07916	0·15684	0·04116	0·07980	52·02	50·96

* Including an average of 5 mg. from diet plus 1 mg. from drinking-water.

have contained as little as 0.76 g. This led us to wonder whether the calcium of cow's milk was *less* available to the rat than that of inorganic salts. However, Kon (1938), who summarized the evidence on this point to date, pointed out that we had not taken into account the fact that the rats which had received milk had grown more than those which had received the salt mixture. Gaunt *et al.* (1938), also contended that without figures for the total calcium and phosphorus content of the animals the relative availability of these elements from different sources can only be decided by balance experiments.

We admit that the criterion of calcification should be total ash content of the bones and not the percentage of ash, but we maintain that if equal amounts of calcium from different sources are equally effective in promoting calcification in any bone (or preferably bones), then the calcium in those sources must be equally available to the animal which demonstrated the effectiveness.

We therefore carried out another experiment in which we determined the calcium content of the milk and of representative whole-day rations of the other foods given, and in which we grouped the animals in a manner better suited to this particular comparison. We used as the criterion of calcification the total ash content of the dry fat-free (*a*) humerus and (*b*) femur. We found that the total ash content of both bones was very slightly higher, but not significantly so, in the rats given extra calcium in milk than in the rats given equal amounts of calcium as inorganic salts. The calcium in each of these sources supplied from a quarter to two-thirds of the rats' total intake of calcium.

Experimental

Eight litters of six rats each were distributed, litter by litter, into eight groups, the numbers of males and females in each group being equal. Each rat was housed in a separate cage and fed on a diet similar to that of the "poorer class," being given weighed portions of each food daily and slightly more than enough white bread to satisfy appetite. In addition, each rat was given a daily dose of 0.12 g. of cod-liver oil. Supplements given were:

Group 1: 0.02 g. of a calcium and phosphate salt mixture
" 2: 0.04 g " " " " " "
" 3: 0.08 g. " " " " " "
" 4: 3 ml. of pasteurized milk
" 5: 6 ml. " " "
" 6: 9 ml. " " "

London tap-water (Bloomsbury district) was supplied *ad lib.*, and the amount taken daily estimated. Each rat was weighed once a week. The calcium contents of a bulked sample of a typical 5-weeks ration for one rat and of the milk given were determined. The experiment was carried on for five weeks. The salt mixture given consisted of:

	G.
Disodium hydrogen phosphate, $Na_2HPO_4.12H_2O$ ..	35.8
Dipotassium hydrogen phosphate, K_2HPO_4	69.6
Calcium phosphate, $Ca_3H_4(PO_4)_2.4H_2O$	68.8
Calcium lactate, $C_6H_{10}O_6Ca.5H_2O$	15.4
	189.6

Results (Summarized in Table)

Increase in Weight of Whole Animal.—The rats given the various doses of the salt mixture increased in weight at almost the same rate—the males at about 11.1 g., the females at about 10.2 g. per week. The response of the rats given graded doses of milk was greater than that of those given the salt mixture, and was graded to the dose given; the increase in weight of the three groups of male rats was 13.4, 15.95, and 16.2 g., and of the three groups of female rats 12.25, 13.4, and 15.0 g. respectively.

Weight of Fat-free Bones (Humeri and Femora).—The dry fat-free bones of the rats given supplements of milk were slightly heavier than those given equal amounts of calcium as inorganic salts, humeri being 5.64% and femora 9.55% heavier.

Weight of Total Ash of Fat-free Bones (Humeri and Femora).—The total ash of the dry fat-free bones of the rats given milk was very slightly heavier than that of the rats given equal amounts of calcium as inorganic salts, the ash of the humeri being 3.68% and that of the femora being 6.58% heavier. Considering that the calcium supplied in the supplements constituted from 25% (lowest dose of salt mixture) to 67% (highest dose of milk) of the total calcium intake, these figures cannot be considered as indicating that the calcium of milk is more easily available than that of inorganic salts.

From these figures it follows that the percentage ash of the bones of the rats receiving milk supplements was less than that of the rats receiving inorganic supplements, the humeri of the "milk" rats containing only 98.15% and the femora only 97.29% of the percentage ash of the "salt mixture" rats. These figures also cannot be considered significant.

Method of Calculating the Results

In order to obtain the ratio between the weight of bones of rats given equal amounts of calcium as (*a*) milk or (*b*) inorganic salts, the average of the logarithms of the weight of the bones was plotted against the total calcium intake. (If plotted against the amounts of calcium taken as supplements these lines would only be shifted equal distances to the left; the slopes and distances apart would not be affected.) The best straight line through each set of three points was determined, the average slope of the two lines calculated, lines with this slope drawn through the points with average *y* and *x* values, and the *vertical* distances between them determined. This was the logarithm of the ratio between the weights of the bones of the rats, whatever their intake of calcium.

A similar calculation was made to obtain the ratio between the total ash contents of the bones of the rats.

Summary and Conclusions

Graded doses of (*a*) milk and (*b*) a calcium and phosphate salt mixture were given daily to groups of rats, 8 in each group, for 5 weeks fed on a "poorer-class" diet liberally supplemented with cod-liver oil for vitamins A and D. Determinations of the total calcium intake of each group were made. It was found that the dry fat-free humeri and femora of the rats receiving calcium as milk were slightly heavier than those of rats receiving calcium as inorganic salts.

The ash content of these bones of the "milk" rats was only slightly greater than that of the "salt mixture" rats.

It follows that the percentage ash in the bones of the "milk" rats was slightly less than that of the "salt" mixture" rats.

None of these differences can be considered significant when it is realized that the supplements supplied from 25 to 67% of the total calcium intake.

It is concluded that the calcium of milk is not more (nor less) easily available for calcification to the growing rat than that of an inorganic salt mixture which contains also an adequate amount of phosphorus.

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Medical Memoranda

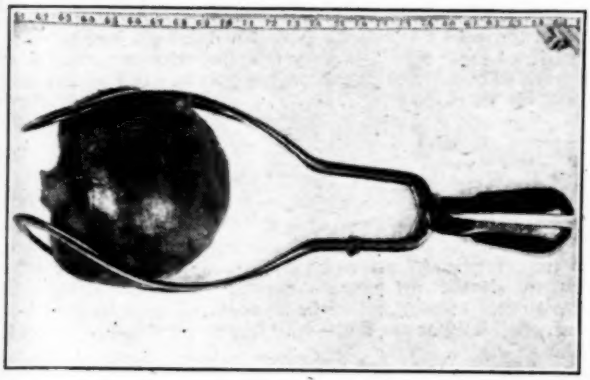
Obstetrical Forceps for Fibroid

Grim stories have been told of doctors who in times past have applied forceps to fibroids in the belief that they were foetal heads. I am unaware of any record of a vaginal forceps application to a fibroid being deliberately performed, and as the manœuvre has on two separate occasions in a relatively short time been of considerable assistance, I believe it may be useful to draw attention to the fact. There is also scope for the use of these instruments during myomectomy by the abdominal route.

CASE RECORD

A woman aged 52, with two children aged 23 and 8, was admitted as an emergency to the Radcliffe Infirmary on March 13, 1943. She was bleeding badly at the time of admission, was very anaemic, and gave a history of recurrent severe losses of progressive amount for the past year. Prior to this, menstruation had been regular, of the 5/28-day type, and the losses were moderate. For some months there had been progressive difficulty in micturition, with frequency and straining.

On admission the patient had a temperature of 99°, pulse 116, and respiration rate of 22. She was well nourished but very blanched. A firm mass could be felt in the midline, rising from the pelvis and apparently the size of a 14-weeks pregnancy. Vaginal examination



showed that this mass was a fibroid filling the pelvic cavity and projecting into the abdomen. The examining finger could not be passed above the tumour to identify the cervix, through which it was apparent the fibroid had been extruded. Transfusion was started and three pints of blood were given slowly. While the third pint was running, the patient, whose condition was now much improved, was taken to the theatre. The previous findings were confirmed, and after catheterization light obstetrical forceps (Wrigley pattern) were applied to the tumour. It was found that gentle traction did not produce any appreciable descent; the pedicle could not be reached, and it was therefore necessary to remove the tumour by torsion or morcellement. An episiotomy was performed and the forceps were gently rotated. The tumour twisted so easily that it was obvious torsion of the uterus could not be occurring, and with surprising ease the fibroid (see Fig.) separated at the base of its pedicle and was delivered. The uterus was small, no other fibroids were present, and there was practically no further haemorrhage and none from the pedicle. As no bleeding-point on the tumour was found it was obvious that the severe haemorrhages had been uterine in origin, but there was no endometrial hyperplasia. The probable cause was that by its position and size the fibroid was elevating the uterus, stretching the uterine vascular pedicle, and thus producing a state of severe chronic congestion.

I have seen a similar case of severe anaemia due to constant bleeding from a normal uterus elevated into the abdomen by a pelvis filled with chronic faecal accumulations. In both cases cessation of bleeding occurred when the two different congesting causes were removed, and in both cases menstruation has since been normal.

Oxford. JOHN STALLWORTHY, F.R.C.S.

The most effective and simple method of cleansing dairy equipment is by steam sterilization, but since any considerable extension of this method is impracticable at the present time, the Minister of Health (Circular 2819) has made new Regulations permitting the use of sodium hypochlorite solutions for this purpose. Approved solutions, a list of which is given in the circular, must have a total available chlorine content of between 9 and 12% w/w and not less than 0.7% of sodium chlorate to act as a "detector" should sodium hypochlorite solutions get into the milk. Copies of the Regulations can be obtained from the Stationery Office.

Reviews

ANATOMY OF MORALE

The Structure of Morale. By J. T. MacCurdy, Sc.D., M.D. (Pp. 224. 8s. 6d.) Cambridge: The University Press. 1943.

Dr. MacCurdy is a well-known authority on psychopathology, and this book should have a wide appeal at the present time, especially as it is lucid and refreshingly free from technicalities. Based on the same sound biological foundations as Rivers and Trotter, it will also appeal to students of the more objective sciences, some of whom are a little apt to look askance at the psychological approach. At the outset he reminds us that the emotional, as distinct from the rational, side of our lives belongs to the mind that we share with animals. This naturally leads on to a study of the conditioning and de-conditioning of reactions (which he prefers to the label of "reflexes"), and thence to a searching analysis of the nature of fear in the light of such information. Not merely are we all liable to fear, we are also prone to be afraid of being afraid, and the conquering of fear produces exhilaration. The Germans in their exploitation of terror had not studied sufficiently the ways in which people may adapt themselves to actual or threatened danger. They themselves had the worst of all possible preparations in having been assured that no enemy aeroplane could penetrate their defences. Behaviour in the face of danger rests on previous emotional adaptations to "signals" just as with Pavlov's dogs. Thus evacuation has increased neurosis, while sticking at the job has tended to reduce it; what is really terrifying about any danger is inability to cope with it. Anticipation of ordeals may lead by training to proficiency in facing them. When there is a deadlock between a striving to do something and an inhibition which keeps it in check, fear arises. This section ends with a discussion of panic fear.

The second section deals with the basis of morale, starting from Wilfred Trotter's distinction between the union of cells to form a new unit the body, and the integration of individuals to form a herd. In the former the co-operation is physiological, in the latter psychological. With man the "herd voice" is not merely a signal for instinctive responses, it has evolved into a body of traditional group experience. For man, be he never so individual, can never escape his biological fate of being a herd animal. To this profound influence of tradition Dr. MacCurdy attributes the varying reactions of different nations under stress, attaching great importance to this as a factor in British morale. The German Empire and the kingdom of Italy, on the other hand, are but recent growths, and the effects of this on morale are skilfully dissected. He tactfully omits detailed discussion of French morale, and reserves his severest denunciation for that of Japan: "Humanity is not in their vocabulary . . . no cure for this cancer . . . except its extirpation." He concludes that the fundamental differentiation of democracy from the authoritarian States lies in its treatment of minorities.

Space prevents reference to the third section, on organization. Suffice it to say that this book is full of good things; it is interestingly written and, despite the gravity of the subject, entertaining.

ORTHOPAEDIC AND INDUSTRIAL SURGERY

The 1942 Year Book of Industrial and Orthopedic Surgery. (Pp. 424; illustrated. 19s.) Chicago: The Year Book Publishers.

This little volume gives a brief and pithy account of many interesting recent developments in orthopaedic and allied subjects. The editor is to be congratulated on his choice of material and the way in which it is presented. To the busy surgeon who finds it difficult to keep abreast with the large volume of literature which he should read to keep up to date such a book is invaluable. The subjects range from tuberculosis of bones and joints to all forms of fracture and dislocation, and bone tumours. A short concluding section deals with special problems of industrial medicine and surgery. The section on fractures of the neck of the femur, Volkmann's contracture, fractures of the patella, and fractures of the humerus are

of special interest. Many of the abstracts are supplemented by a brief editorial note, giving the editor's personal opinion.

There is one minor defect which is difficult to remedy in a book of this size. So far as is possible the illustrations correspond with the text, but in some instances the illustrations of one article overflow into succeeding pages and become divorced from their own text. A great deal of the value of the book lies in the excellence and multiplicity of its illustrations, so that they should not be cut down. The small size of the pages makes it difficult to balance the illustrations with the relevant texts.

VENEREAL DISEASES: A POPULAR BOOKLET

Venereal Disease in Britain. By Sydney M. Laird, M.D., Ch.B., F.R.F.P.S.G., D.P.H. (Pp. 80. 9d.) Harmondsworth: Penguin Books Ltd. 1943.

Many people have long been seeking information about venereal disease; now they have got it in *Venereal Disease in Britain*, by S. M. Laird. The publication of this little book written in popular language is more than welcome and cannot be considered a coincidence; the author knows his subject and proceeds to set out briefly the history of venereal disease, what it is, how prevalent it is, and how he thinks it should be dealt with. The facts are presented clearly and succinctly; the descriptions of gonorrhoea and syphilis could hardly be bettered, and the chapter entitled "The Tragedy of Venereal Diseases" is a picture by no means overdrawn. It calls to mind Brieux's *Damaged Goods*, and should serve to emphasize the axiom that early recourse to skilled aid is the way to avoid serious consequences which might otherwise wreck the lives of whole families.

It is when the author turns to the control of venereal disease by compulsory methods that he is on less sure ground. Is it certain that measures which have admittedly been successful in Sweden will be equally successful in Britain? Certainly there is much food for thought in the suggestions put forward; but those who are interested in the pros and cons of compulsory measures will do well to read in connexion with Dr. Laird's proposals the report of the British Mission[1] which visited Scandinavia in 1937 before coming to a definite conclusion. It seems very doubtful whether this country is yet ripe for full compulsion; legislation can hardly go ahead of public opinion.

This really excellent little Penguin Special deserves a very wide circulation. It is written for the man in the street, and all young men and young women will do well to ponder carefully over the lesson which it teaches; by so doing they may dispel their ignorance and save themselves and others much misery and many reproaches.

[1] Reports on Public Health and Medical Subjects, No. 83, 1938.

Notes on Books

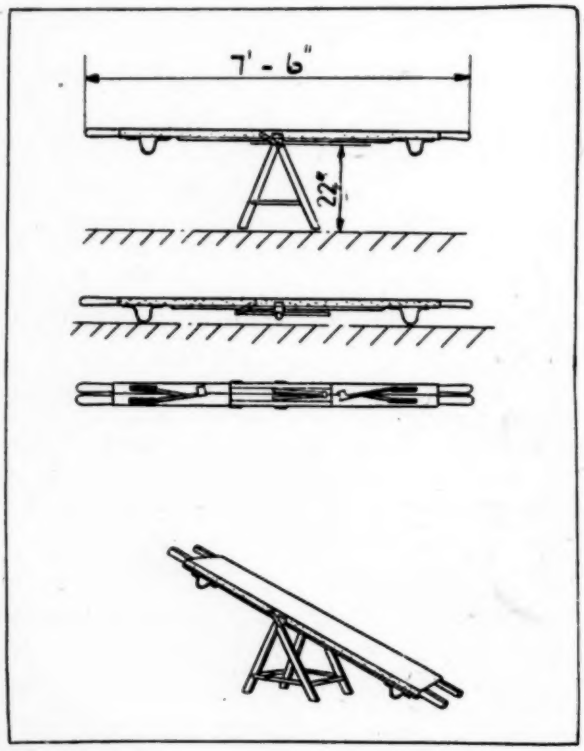
The *Wilson Hospital in the Front Line* tells the story of the expansion of this Mitcham hospital (provided for the district by Sir Isaac Wilson) from a peacetime size of 72 beds to 123 beds as an "advanced base" hospital under the E.M.S., and of its work during the raids of 1940–1 for the injured of Mitcham. This locality had its full share of the horrors of that time, and the pamphlet (price 6d.) describes a typical night at the hospital during the height of the "blitz"—a story reflecting what organization and hard work efficiently and ungrudgingly performed can achieve under frequent air attack.

Preparations and Appliances

ROCKING DEVICE FOR ARTIFICIAL RESPIRATION

Dr. JOHN R. LAHIFF, a Major in the Home Guard, writes:

Since the publication of that admirable article by Surg. Lieut. G. H. Gibbens (*British Medical Journal*, 1942, 2, 751) I have been advocating in my lectures the use of Eve's rocking method



of artificial respiration. To most audiences the principle of the idea is readily acceptable and the little skill necessary to its application quickly acquired. Various suggestions for improvisation have appeared in the *Journal* and have emerged from demonstrations I have given. But, as Gibbens says, "there is little time for invention when a drowning man is on deck." Surely we should not have to depend on improvisation when the possibility of the method being required is so universal and urgent, especially at sea and—who knows how soon?—"on the beaches."

The following is a description of a device which it is hoped might meet the situation. In the interests of brevity a diagram is included.

1. It will be seen that use is made of an ordinary stretcher.
2. The trestle arrangement is a fixture, and in no way interferes with the normal use of the stretcher as such.
3. The additional weight is only 4 lb., and the floor-clearance is not affected.
4. It can be opened and placed in working position in under 30 seconds. Thus the time-lag occasioned by improvisation is eliminated, as is also the confusion associated with the necessary coincidental initiation of artificial respiration by Schäfer's or Silvester's method.
5. It can take a person of any weight.
6. It will be seen that the height of the trestle is only 22 in., as compared with 32 to 34 in. as suggested by Gibbens. The purpose of this reduction in height is to ensure a uniform amplitude of "rock." The operator is instructed to hit the deck with the pole-ends at the completion of every rock. It is hoped that in this way an arbitrary amplitude will be avoided, and as a result a more regular rhythm rendered likely and a more uniform periodicity established. An initial sudden jerk of the "head" end downwards at 30 degrees would serve the same purpose as Gibbens's initial dip at 50 degrees.
7. The lower trestle also enables the operator to work the stretcher from the kneeling position. This is considered important, as back-bending would be unnecessary; it is far less tiring, and relays are therefore not required.
8. It is considered advisable that the operator should work at the head end of the stretcher, as he can then observe any signs of return to normal breathing and be ready to alter his rhythm.
9. The device is inexpensive, especially if provided in large numbers.

It is suggested that if all stretchers were to be fitted with such a device a great saving of life might be effected, especially at sea in wartime. They might usefully be included in the equipment of docks, canals, electric-power stations, bathing-beaches, swimming-pools, coal mines, etc.

I wish to record my gratitude to Major D. Walker, 71st Batn. (Ormskirk) H.G., both for his drawings and his help in providing a working model.

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PROBLEMS OF HYPERTENSION

If any confirmation were needed of the frequency of hypertension it is provided by a recent study in the United States.[1] Defining hypertension as a blood pressure of 150 systolic and 100 diastolic or higher, the authors found that about one-third of the male population and over two-fifths of the female population at ages 40 and over had hypertension. So common a disease has naturally inspired a great deal of study, and visitors to America shortly before this war often came away with the impression that every clinic in the U.S.A. was working on the disease. So much literature has resulted from this activity that it has been impossible for the ordinary reader to keep pace with it, and many will be grateful to Prof. G. W. Pickering for making this the subject of his Oliver-Sharpey lectures, printed in this and our last issue. Pickering points out that a raised blood pressure, like a raised temperature, is a symptom which need not always have the same pathological basis. High blood pressure may be considered in relation to three main types of disorder. The first and most important is constituted by essential hypertension, chronic nephritis, and coarctation of the aorta. The second includes acute nephritis and the toxaemia of pregnancy, and the third is the rare form of hypertension due to excessive secretion of adrenaline by tumours of the adrenal medulla. Clinically, toxaemia of pregnancy resembles acute nephritis in respect to hypertension, albuminuria, and generalized oedema, and in both conditions there may be subsequent development of permanent vascular disease.[2] They differ from the first and major group of hypertensive cardiovascular disease in that the renal blood flow is not decreased, and, in acute nephritis at all events, the hypertension can be prevented by renal denervation.

The major facts which appear to have emerged in reference to the main group of hypertensive diseases are that the vasoconstriction is not neural in origin and that the renal blood flow is decreased. One of the chief stimuli to recent research has been the demonstration by Goldblatt that constriction of one or both renal arteries results in severe persistent hypertension with normal renal excretory efficiency as measured by urea clearance, a condition closely similar to essential hypertension in man. The steps by which it has been proved that essential hypertension is not due to structural changes in the arteries or to sympathetic overactivity are clearly shown in Pickering's lectures. The changes in the circulation are very different from those produced by neural vasoconstriction or by the adrenal and posterior pituitary hormones, in which the skin is depleted of blood. Pickering's calculations suggest that in essential hypertension there is a 40% decrease in the blood flow to the kidneys, a 60% increase to the muscles, and a 10% increase to other tissues such as the skin and the brain. It is also generally agreed that in the kidney vasoconstriction affects particularly the efferent glomerular arterioles. Very characteristic changes in renal function can be demonstrated by the searching method of the study of the clearance of inulin and diodrast. This demonstrates that the tubular excretory mass or total function of the kidney is greatly reduced. The effective renal blood flow is also reduced, while the rate of glomerular filtration is much less reduced than the tubular function, so that the fraction of the renal blood flow filtered off in the glomeruli is increased.

It would seem appropriate to explain all these effects in terms of the Goldblatt experiment and its humoral consequences. When the blood flow to the kidney is restricted a substance renin is produced. Renin is a ferment, and it reacts with the alpha globulin of the plasma (hypertensinogen or renin-activator) to form a fairly stable substance, hypertensin or angiotonin, which produces the same type of rise in blood pressure as is found in essential hypertension.[3] One might therefore expect that the primary disturbance in essential hypertension and chronic nephritis is a structural lesion in the kidney which produces a change in the blood supply to the glomeruli akin to the Goldblatt experiment, and it is indeed such a lesion of the afferent arterioles which Pickering postulates in his final hypothesis. The suggestion is made difficult of acceptance by the work of Castleman and Smithwick.[4] These authors took biopsy specimens of kidney and muscle during the operation of sympathectomy for the treatment of high blood pressure. The average pressure in their hundred patients was 210/130, and the hypertension had been present for about six years. Nevertheless 28% of the biopsies showed no or insignificant vascular disease, and in an additional 25% there were only mild changes. It is clear that the end of the story is not yet told. Vascular changes in the kidney aggravate hypertension and produce a vicious circle, but it does not seem that the time has yet come to abandon the orthodox view that the hypertensive state precedes the renal vascular disease in many cases. We may have to look elsewhere for the primary disturbance of the renin–hypertensin mechanism that sets the fatal engine of destruction to work.

The clinician looks to research not for a sign but for a cure, and he will be anxious to know whether these discoveries have led to any advance in therapeutics. The answer unfortunately is: Not yet. The theoretical basis of the treatment of hypertension by sympathectomy has been undermined, though many would still defend the operation on its results in practice. It provides an opportunity to explore the adrenal glands and has revealed the unsuspected frequency of tumours. Seven of Castleman and Smithwick's patients had tumours of the adrenal glands, and two of them were pheochromocytomas of the medulla, which had presumably provoked the hypertension. The only immediate application of the Goldblatt experiment is the realization that hypertension may be produced by unilateral renal disease and may be relieved by unilateral nephrectomy. The disease must be of a type to produce atrophy and vascular sclerosis, and these conditions may be found in pyelonephritis and calculous nephritis. In hypertension of recent origin in the young subject it is always worth thinking of the possibility of unilateral renal disease and the relief of the hypertension by nephrectomy, though the chances of lasting improvement should not be rated too high. The possible medical applications of the renin–hypertensin mechanism seem more hopeful, though we are still in the land of surmise. Renin acts more powerfully in recently nephrectomized animals, and repeated doses of renin in intact animals rapidly diminish in effect. This and other evidence has led to the hypothesis of an angiotonin-inhibitor or hypertensinase which is secreted by the kidneys and to a lesser extent by the intestine. Extracts of kidney have therefore been prepared for the treatment of hypertension in experimental animals and man, but the

[1] Master, A. M., Marks, H. H., and Dack, S., *J. Amer. med. Ass.*, 1943, **121**, 1251.
[2] Dexter, L., Weiss, S., Haynes, F. W., and Sise, H. S., ibid., 1943, **122**, 145.
[3] Plentl, A. A., and Page, I. H., ibid., 1943, **122**, 136.
[4] Castleman, B., and Smithwick, R. H., ibid., 1943, **121**, 1256.

effects are often clouded by the presence of pyrogens and toxic principles which may themselves lower the pressure. Nevertheless, some of the results obtained are full of promise.[5]

EPIDEMIOLOGY OF DIPHTHERIA

The response to the campaign for immunization against diphtheria, despite the publicity given to it, has not been large enough to attain the desired result of eliminating diphtheria as a major cause of mortality. At a recent Press conference at the Ministry of Health the Chief Medical Officer stated that about half the child population had been immunized, and a drive to increase this proportion to at least three-quarters was to be made. In these circumstances the report by W. T. Russell[6] has a topical interest. This paper gives an excellent statistical review of the trends of mortality and morbidity during the past 40 years and a chapter on immunization.

The mortality from diphtheria during this period has fallen by approximately 60% in England and Wales. Among the factors that may have been responsible for this reduction are : a possible change in the type of the disease ; the improved social conditions of the last two decades, which may have increased the recuperative powers of those attacked ; an increase in the proportion receiving hospital treatment at an earlier stage of the disease ; changes in method of treatment. Hospital records support the last two suggestions. The case fatality rises rapidly as the length of the interval between onset and administration of antitoxin increases, and the curve of fatality reaches an asymptotic level at the fourth day, after which the progress of the disease is not influenced to any extent by antitoxin treatment. An example of changes in treatment is provided by the London hospitals. In 1916 the average dose of antitoxin was 16,607 units per patient, and in 1925 it was 26,335, while the corresponding average case fatality was 12.2 and 4.8. The decline in mortality has not been uniform for each age group but has fallen more rapidly for the pre-school ages of 0–5 than for the school ages. In the quinquennium 1906–10 the death rates at ages 0–5 was 163% and at ages 10–15 it was 15% of the rate at ages 5–10. In 1931-5 the death rate at ages 0–5 had dropped to 95% of the rate at ages 5–10, while the death rate at ages 10–15 had risen to 24%. An entirely different trend was observed in the U.S.A., where the rate at ages 1–5 rose from 207% of the rate at ages 5–10 in 1920-4 to 315% in 1935-8, while the rate at ages 10–15 fell from 26.4 to 22.0% of the rate at ages 5–10 during the same period. The fall in the birth rate and improvement in environmental conditions are the factors that were responsible for the trend of the mortality in England and Wales. A study of the London rates shows that in the residential areas the rate at ages 0–5 as a percentage of the rate at ages 5–15 remained practically constant at 210 during the last 30 years, while in the densely populated areas the index fell from 637 during 1911-13 to 231 during 1937-8. As a result of the decreased birth rate the families in the overcrowded areas have become smaller ; the children are not exposed to the same intensity of infection as formerly, and now tend to have a risk of infection that approximates to that of children in residential areas. The result is that in the poorer areas relatively more children contract the disease and die of it during school life than used to be the case. The opposite trend experienced in the United States was probably due to concentrating at first on immunizing the school child, and the relative greater reduction of mortality at these ages indicates the efficacy of controlling the death rate from diphtheria by active immunization.

The annual case rates—based on the total population because the age of the patient is not notified to the Registrar-General—show a slightly rising trend during the past 30 years. The case rate fluctuated between 105 per 100,000 population to 186 during this period. The child population at ages 0–15 has declined from 32% of the total population in 1901 to 24% in 1931, and the slight rise in the notification rate means that there has been an increased incidence among children unless the incidence among adults has become greater. This may not be a real increase, because more attention is now paid to this disease and the number of doubtful cases has grown. Although a case is notified as diphtheria, no correction is made in the returns when a different diagnosis is arrived at in hospital. The diagnostic error in London was 15% in 1901-2, 23% in 1928-9, and at the North-Western Fever Hospital in 1941 it was nearly 50%. The incidence of morbidity in London follows the trend of mortality ; the children aged 0–5 in the densely populated districts have a higher incidence than those in the residential areas ; but whereas the children aged 5–10 in the residential areas had a rate in excess of those in the densely populated areas during the first part of this century, the position was reversed at the end of the period. A similar change in the adult notification rate of London was noted. In the first part of the period the rate for adults was greater in the residential districts, but at the end of the period the rate was lower than in overcrowded boroughs. No national statistics of age incidence are available, but the reports of the local M.O.H. suggest that variations exist between the age distributions of different areas. During 1936-7 one-third of the cases notified in London were aged 0–5, while in Manchester one-fifth of the cases were in this age group, although the children in the group formed 7.52% of the population in Manchester, compared with 6.76 in London.

Russell reviewed trends of diphtheria in New York and Toronto, where inoculation has been intensively practised. He concluded that there is strong evidence that immunization has lowered the mortality and morbidity rates of both cities. Although the incidence had been declining before immunization was introduced, the statistical experience of diphtheria in both cities is significantly better than would have been expected from the trend of either mortality or morbidity in the pre-immunization period. In the pre-immunization period an epidemic occurred at intervals of six years in New York and four years in Toronto, and therefore epidemics should have appeared in both cities between 1930 and 1940 but did not. The proportion of children immunized in the county boroughs of England is in sharp contrast to New York City and Toronto : there were two towns, Hastings and Hull, where fewer than 50 per 1,000 had been immunized during 1940-1, and only one town, Lincoln, where half the children had been immunized. A comparison of the experience of the large county boroughs with a population of 150,000 or more shows some interesting contrasts. Hull and Liverpool had the highest death rates, 72.7 and 60.5 per 100,000 of the population aged 0–15, and the highest notification rates, 278 and 253, and the lowest proportion of children immunized, 47 and 57 per 1,000 respectively. Bolton and Newcastle with large immunization rates of 346 and 306 had death rates of only 17.9 and 19.7. A negative correlation was found for immunization and both mortality and morbidity, though the former was not statistically significant.

The discovery and classification of three types of diphtheria bacilli—mitis, intermedius, and gravis—has enlarged

[5] Page, I. H., and Corcoran, A. C., *Advances in Internal Medicine*, 1942, 1, 183

[6] *The Epidemiology of Diphtheria during the last Forty Years*, by W. T. Russell, D.Sc. Med. Res. Cncl. Sp. Rep. Ser. No. 247. H.M. Stationery Office. (1s.)

the scope of diphtheria statistics. The last two are generally said to be the severe forms of the disease and have a high fatality, while infections of the first type are milder. From the data available it appears that gravis is now the prevailing type, but there is not enough statistical evidence to show that this type is always accompanied by a high mortality. There is evidence that the type of infection varies within a district. The predominant form in Edinburgh during 1936 was intermedius with 54.4%, and gravis formed only 28.1% of the infections, but as a result of a continuous rise in the proportion of gravis the percentages were 83.3 for gravis and 10.8 for intermedius in 1939. In 1937 the most frequent type in Liverpool was mitis, 41.1%. This proportion fell to 11.1 by 1941, while during the same period gravis rose from 34.2 to 71.1%. The experience of Southampton showed that the types were in constant proportions during the years 1936-40, with about two-thirds of infection due to mitis. The changes in the type incidence may be related to the proportion of immunized children, but the data are not large enough to make this more than a suggestion.

ACTION OF DIGITALIS

For many years it was believed that digitalis influenced the heart mainly by a vagal action which slowed the rate. This belief arose from the fact that digitalis was regarded as a specific in the treatment of auricular fibrillation; and it is only after some 30 years of clinical and laboratory study that attention is now more specifically focused upon the action of digitalis on the heart muscle. Thus Gold and his co-workers[1] showed that the slowing brought about by small doses of digitalis in man was abolished by large doses of atropine. This vagal slowing could be attributed to a reflex following the improvement in the myocardial compensation. After larger doses of digitalis, however, atropine no longer increased the cardiac rate, so that the ventricular slowing must have been due to an extra-vagal action of digitalis. The practical importance of these considerations is expressed in the fact that arrhythmias must no longer be regarded as the primary indication for digitalis therapy, but rather cardiac decompensation. There is also a tendency nowadays to turn to the use of the pure alkaloids separated from the crude digitalis leaf; and it must be admitted that the methods of standardization of the crude leaf were not always an absolute reflection of the therapeutic requirements. Rose and his associates[2] found that digoxin was very satisfactory when given orally to some 88 patients, of whom 55 were under constant supervision in hospital. For rapid digitalization they recommend an initial dose of 1.5 mg., followed by 0.75 mg. six-hourly until the desired effect has been achieved. These doses may be increased or decreased by 0.25 mg. to suit the individual patient, and the average therapeutic and toxic doses by this method were 3.75 and 6 mg. respectively. For digitalization with single doses daily they recommend 1 to 1.5 mg., and for maintenance somewhat less than a third of that required for full digitalization. The toxic manifestations with digoxin were like those of the crude leaf, but of brief duration. Though intravenous therapy (1.5 to 2.5 mg.) was followed by an effective response, usually within 15 minutes, there were 2 fatalities in the series of 13 patients; these patients were in any event bad risks, and it is not certain that death was in fact immediately due to the digoxin, but the limitations and dangers implied are self-evident. On the other hand Tandowsky[3] has studied the glycoside lanatoside C (from *Dig. lanata*) on some 40 patients, comparing the effect of 16 gr. *Dig. purpurea* orally with a single dose of 1.6 mg. lanatoside C intravenously. The maximum alteration of the S–T segment in the E.C.G. was seen within 2 to 3 hours, which was 11 to 12 hours sooner than with *Dig. purpurea*. There were no fatalities; toxic effects were mild and transient, and on these grounds Tandowsky recommends the drug especially where quick action is desirable or gastro-intestinal symptoms are troublesome. However, it is reasonable to expect further clinical trials before these drugs displace entirely ouabain, the strophanthin derivative, in parenteral therapy, and in general it can be said that claims for a particular glycoside based on the toxicity are deceptive, as the toxic manifestations are mainly extensions of the therapeutic effect.

[1] *J. Pharmacol. exp. Therap.*, 1939, **67**, 224.
[2] *Amer. Heart J.*, 1942, **24** 435.
[3] Ibid., p. 472.

TRANSMISSION OF KALA-AZAR BY THE SANDFLY

Few tropical diseases in the course of their investigation have more puzzled and at times more surprised the research worker than has kala-azar. It was first thought to be a form of chronic malaria, and from this arose the classical conception of "malarial cachexia." Discovery of the Leishman-Donovan body brought to a sudden end the controversy as to whether or not kala-azar was malaria or some other condition. No sooner had workers begun to speculate on the nature of this quite new and strange form of parasite when Rogers found that Leishman-Donovan bodies developed into flagellates of the well-known herpetomonad type when kept *in vitro* under certain conditions. The next mystery was the manner in which this parasite, included in the visceral cells, could be transmitted. The most likely view was that it was carried by an insect host, a possibility made more feasible by the discovery that the parasite did at times occur in the peripheral blood, though in small numbers. The most promising of possible vectors appeared to be the bed-bug, but after much work it became clear that this pest must be exculpated. Experiments were made on lice, *Triatoma*, *Ankylostoma*, and other possible hosts. Finally Knowles, Napier, and Smith, working on the Ancillary Kala-azar Inquiry at Calcutta, recorded that in the gut of sandflies fed on kala-azar cases flagellates could be observed which were indistinguishable from the flagellate form of the Leishman-Donovan body—an observation soon proved to be true. Investigation of this stage in the life history of the parasite was further carried out by feeding experiments by the Kala-azar Commission in Assam. Shortt, Barraud, and Craighead found that in a proportion of fed flies the buccal cavity was so heavily infected with flagellates that a bite could scarcely fail to inject the organism when the flies next fed. Once more, however, the smooth course of investigation was interrupted, for the laborious efforts of Shortt, Craighead, and Smith to infect human volunteers by the bites of sandflies fed on kala-azar cases were uniformly unsuccessful. In one series alone in this work over a quarter of a million sandflies were reared and nearly one hundred thousand fed. It is with especial interest, therefore, that we can now record the successful transmission of the kala-azar parasite through the bite of the sandfly. This is the work of Swaminath, Shortt, and Anderson,[1] who have followed the technique described by Smith, Halder, and Ahmed in 1940: infected sandflies were kept alive by feeding on vegetable juices until ready to infect. Five human volunteers were utilized and all five developed infection. Thus at the end of some twenty years of almost continuous active research has the final proof been given of the sandfly transmission of this dread and widespread tropical disease.

[1] *Ind. J. med. Res.*, 1942, **30**, 473.

EVACUATION: A BRIGHTER PICTURE

We have had so many dismal tales from the reception areas that it is all the more refreshing to get a report from one of them which gives, not indeed a rosy picture, but one less dun-coloured than most. The area is Westmorland, which received during four evacuation periods 11,600 children, chiefly from Newcastle and South Shields, but some also from the other side of England, at Barrow. In a booklet issued by the county council Dr. J. F. Dow, the county medical officer, and Miss M. A. Brown, a psychiatric social worker, describe Westmorland's experience. Here as elsewhere bed-wetting among the evacuees was a major difficulty. It is stated that the enuretics were divisible into four groups: those who had a short spell of enuresis as a response to a new and difficult situation; those who found difficulty after their home training, or lack of it, in adjusting themselves to a higher standard of cleanliness; those who were highly strung and nervous; and those whose enuresis had some physical background. Some of the chronic cases cleared up completely on the children being removed from the homes where they were billeted and placed in hostels. Others who were thought to have improved broke down again when faced with difficulties in school or in their billet. Purely medical treatment by drugs when no physical cause was found was of little use, and various experiments with recommended remedies completely failed. Next to this group the largest number of "referred" children were those showing behaviour problems, but these were mostly superficial, and the opinion is expressed that juvenile delinquency has been exaggerated. An analysis of the cases of difficulty showed that the fault was more often in the parents than in the children themselves, and sometimes it lay to a certain extent in their hostesses. The evacuated children in Westmorland gained in every way physically, and proved wonderfully free from infectious diseases. The problem of scabies was larger than had been expected, but the use of benzyl benzoate emulsion reduced it to small proportions. On the whole a tribute is paid to the children, who showed great powers of adaptability. The chief disappointment was the heavy drift back during the first few weeks immediately after each of the evacuations.

THE WELLCOME MUSEUMS

Frequent inquiries are being received, from this country and abroad, with regard to the Wellcome Museum of Medical Science and the Wellcome Historical Medical Museum. They are, and will continue to be, housed in the Wellcome Research Institution, 183-193, Euston Road, N.W.1. The Wellcome Research Institution building suffered considerable damage by enemy action, but its structure was unharmed and the museums can quickly be put into shape again as soon as labour and materials become available after the war. Though some of the objects in the Wellcome Historical Medical Museum were damaged, it has been possible to replace or repair most of them. Fortunately the specimens and other valuable material in the Wellcome Museum of Medical Science remained comparatively intact. Both museums are now under the directorship of Dr. S. H. Daukes. A comprehensive scheme for the Wellcome Historical Medical Museum has been prepared and will be brought to completion as soon as possible after the end of hostilities. The Wellcome Medical Library, comprising over 150,000 volumes, will also be in the same building, and suitable accommodation will be provided for research workers so that both the library and collections may be readily available. The Wellcome Museum of Medical Science—which in the past has been much used by teachers, students, and those engaged in postgraduate studies—will be re-established in its entirety at the end of the war with the utmost speed. The large Lecture Hall will be fully re-equipped, including film projection apparatus, and will then be available for scientific lectures and meetings.

THE WAR AND THE PRESS

So gradual have been some of the changes brought about by total war that many otherwise observant people would be astonished if they held in one hand a copy of their favourite newspaper or review of to-day's date, and in the other a copy published four summers ago. Reduction in bulk is the most striking effect of the shortage of paper, but every periodical has adopted other means for economizing space, such as the use of smaller print and narrower margins, and all who can do so have cut down circulation. Hard is the lot of this *Journal*, with an obligatory circulation of 42,500 copies a week and an inflexible Paper Controller; the ration simply will not suffice. In a recent speech on "The Press and the Nation in Wartime" Lieut.-Colonel J. J. Astor, chairman of the Times Publishing Company, dwelt on the important part played by the Press in our democratic institutions in peace, and even more so in war. Besides reporting events it has the function of explaining Government policies and schemes, and also of criticizing and showing up Government schemes where they are not operating fairly or as intended. This holds good of scientific and professional organs no less than of reputable daily and weekly newspapers. So, too, in the matter of censorship: in wartime, as Colonel Astor said, there has to be a censorship, but ours in this country is voluntary. Guiding lines are given, certainly; some forms of information obviously help the enemy. When in doubt an editor naturally refers to the Censor, and where men's lives are involved the final decision must rest with the Service authorities. At times the Censor has seemed to the Press to go rather far, but Colonel Astor reminded his hearers that censorship is not a normal occupation, and it was inevitable that at the beginning of the war there should have been mistakes and unnecessary delays—not all of them the fault of the Censor. For our part we have no quarrel with that section of the Press and Censorship Bureau with which we make contact on the score either of delay or of obstruction; submitting proofs is just one of the trials of journalism in wartime. With regard to the drastic rationing of paper, Colonel Astor said (and we agree with him) that if a newspaper is to carry out its functions—to give news and relevant comment, to give Parliamentary debates, official statements and lists of honours and awards, to encourage salvage drives, etc., and to retain its features in however attenuated a form—then the Press has made the maximum economies and has reached the minimum consumption of paper necessary to perform these functions.

It is hoped that doctors who send in notifications of change of address will understand that delay in putting these into effect is inevitable by reason of the exceptional conditions under which the depleted staff at B.M.A. Headquarters is working. As many as 900 changes of address, and in the rank of serving members, may be notified in a week. Each of these changes has to be stamped on to a new plate for the *Journal* wrapper. The work is heavier than in peacetime; the staff is less. Members are therefore asked to be forbearing if what seems to them a very small alteration is not made as quickly as they might expect.

SOME PROBLEMS OF REHABILITATION

BY

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Emergency Medical Service

Rehabilitation is the popular term of the moment, as freely discussed in non-medical as in medical circles. As is usually the case with new forms of therapy, there is for the time being a violent swing of the pendulum, and rehabilitation threatens to displace the old-time tonic as a convalescent cure for one and all. This may possibly be followed by an equally violent swing in the opposite direction. But there is little doubt that rehabilitation has come to stay, and will form an integral part of the health services of the future. It is therefore of the utmost importance that its problems should be carefully studied and understood by the profession, and the fullest advantage taken of the present opportunity, created by war conditions, to test out experimental methods and lay the foundations of a sound and scientific scheme.

Nothing would be more unfortunate than for rehabilitation to be divorced from medical or surgical control and established as a new health cult. But that is exactly what may happen unless the profession takes the matter seriously and exercises a guiding and controlling hand; for rehabilitation is a subject which goes far wide of medicine and surgery. Already it is interesting the Ministries of Labour and of Fuel as a means of expediting the recovery of workmen after serious illness or injury and ensuring a more rapid return to employment. It is interesting all who are concerned with physical culture and with the maintenance of general fitness. And not only does it form the central theme of the Tomlinson report but it is written deep in every scheme of post-war sociological planning. There is a real risk of rehabilitation becoming an entity in itself, with so-called rehabilitation centres opened up all over the country without any adequate medical supervision, and a fruitful and most promising form of therapy thus led away along unscientific lines. That will not happen if the medical profession takes firm control from the outset, but to assume such control it is necessary to have a clear view of the problems involved and of the methods by which they may best be solved. It is the purpose of this article to marshal the chief facts connected with rehabilitation, and to attempt to suggest the lines along which healthy development may follow.

In the first place, what do we mean exactly by rehabilitation? It is an unfortunate and clumsy term, and one which is already being used with a variety of different meanings, but from a strictly medical and surgical aspect it can perhaps best be defined as the method by which physiological function is fully restored after its temporary loss from injury or illness. This applies to every form of debilitating disease, accident, or surgical operation, and equally in the physical and the psychological spheres, and no rehabilitation is complete unless it pays due regard to both.

At this point we are met with the objection, already articulate in some quarters, that the physician's task is to cure disease, and that if we will stick to our job Nature will do the rest. We seem to have met that objection before, but it really will not bear a moment's consideration, for the whole purpose of the physician and surgeon, when it comes to questions of ill-health and injury, is to supply what Nature lacks. Every surgical operation, every modern therapeutic agent, every use which we make of serology and roentgenology and physical medicine, bears witness to our conviction that Nature, unaided, will not by any means necessarily perfect her cures. This is as true of the restoration of function as it is of the overcoming of infection, the setting of a fracture, or the removal of a malignant growth. It is therefore incumbent upon us to make a careful study of the factors which prejudice full and speedy return to vigorous health, and the methods by which those obstacles can best be met and overcome.

Let us consider, in the first place, the facts which we require to know as a preliminary to formulating a sound and scientific scheme of rehabilitation. We shall then be in a position to discuss such important questions as the organization of a rehabilitation team, the training of staff, the grading of patients, the provision of the essential facilities, the preparation of handbooks, the relationship of in-patient, out-patient, and post-hospital rehabiljtation, and the resettlement of the rehabilitated patient in some form of useful employment.

Problems for Research

A vast amount of time and thought is constantly being expended on the diagnosis and treatment of disease and injury, but surprisingly little attention has ever been paid to the equally important question of the restoration of function. There are innumerable points upon which more research and statistical study is needed before a sound programme of rehabilitation can be drawn up. Here are a few of them:

1. The effect of trauma on every type of soft tissue—fascia, muscle, tendon, serous and synovial membrane, etc.—demands careful study, and we need to know far more accurately than we do at present at what stage, and to what extent, restricted movement is beneficial or harmful, both to healing of the injured part and to the rapid and complete restoration of function. For lack of this exact knowledge many of our rehabilitation methods are of the nature of trial and error—hence the contrary views of those who advocate and those who oppose early remedial exercise. It should not, however, be difficult, by means of controlled experiment carried out on a sufficient number of cases, to establish definite criteria by which to judge of the methods suited to each class of disability and to each stage of recovery.

2. The relationship of pain to immobility is by no means clearly defined; still less do we know of the conditions under which it is wise to abolish pain and promote mobility in diseased or traumatized tissue. It is commonly claimed that pain is Nature's call of alarm, demanding rest and immobilization for the injured part; but that is by no means the whole of the story. We are all familiar with the type of pain produced by stretched ligaments and adherent soft tissues in which mobilization, and not immobilization, will alone cure both the stiffness and the pain. We are familiar, too, with the so-called "vicious circle of pain," as illustrated by certain injuries in the neighbourhood of joints, the trauma producing effusion which causes pain, and the resultant pain leading to sympathetic disturbance and vasodilatation, and hence to more effusion. In such conditions the abolition of pain by deep novocain injection, as advocated by Leriche, or by intensive freezing with ethyl chloride, certainly hastens the restoration of function in a large number of cases. The same may well be true of other analogous conditions in which pain is associated with immobility. In this connexion an interesting suggestion has been made by a recent colleague of mine, Mr. J. M. Fitton, that the frequency of persistent pain after severe spinal injuries—a frequency much more pronounced than after equally severe injuries in other parts of the body—may not be merely a "litigation neurosis," as so commonly alleged, but may be due to the fibrosis and adhesion of soft tissues, and that where manipulation fails to effect a cure it would be worth while to try the effect of mobilizing the parts by open operation, followed by a course of remedial exercises. It is a suggestion well worth putting to the test.

3. It is now generally accepted that prolonged immobilization is to be deprecated in the treatment of fractures, owing to its tendency to produce muscle-wasting, stiff and painful joints, and decalcification of bone. What is not so clear, however, is the best time for starting muscular activity. One school of orthopaedic thought states positively that any movement prior to bony union is harmful, and that, provided a well-fitting skin-tight plaster is applied, bony union within reasonable time is certain, after which movement should be started; whereas, according to these authorities, a padded plaster and early movement involve a serious risk of non-union. This view is countered by others who claim that, provided the fracture is in good alignment and controlled by a properly applied padded plaster, changed at intervals, muscular drill within the plaster combined with regular exercise of the more distal joints (e.g., the hip and toes in the case of fracture of the tibia) not only never leads to non-union but actually expedites the date at which consolidation occurs. This is a matter which can only be settled by experiment over a long series of cases, but it is obvious that if the latter contention is the correct one, and the adoption of such measures reduces the period of inactivity of all fracture cases by a week or a fortnight, the resultant gain all over the country, as expressed in man-day power, would be a great economic asset.

4. Too little is yet known as to the factors which hinder return to full use of a joint subjected to open operation, such as a knee-joint after meniscectomy. Most orthopaedic surgeons have to admit to a small minority of cases in which complete recovery is delayed by pain, by lack of full flexion, or by recurrent effusion. How far is this due to inadequate haemostasis at the time of operation; to particular methods of technique; to low-grade sepsis or local irritation; to too early or to too late movement; to excessive or to inadequate quadriceps drill; to too drastic or to too premature attempts at flexion; or to the use of such resistance exercises as those

provided by weights and pulleys? Far more evidence is needed than is yet available on all these points before we can answer any of these questions, but such evidence is essential if the right methods of rehabilitation are to be chosen for such cases, and—what is perhaps even more important—if patients on whom remedial exercises will have to be slowed up are to be recognized early.

5. The optimum range of movement for every type of disorder, adapted to the stage of recovery, needs to be carefully worked out and formulated. Too often this is left entirely to masseuses or physical instructors, with no medical supervision and no means of checking whether the exercises given are suited to the particular joints or muscles affected, or are too strenuous or not sufficiently active.

6. The remedial exercises in current use have mostly been designed for traumatic cases. But rehabilitation is required for every form of debilitating illness or disorder, not merely for those resulting from accident. Similar care is therefore needed in working out progressive courses of rehabilitation for every variety of medical and surgical complaint. Special exercises are required for thoracic patients, both to promote the activity of the thoracic muscles and to assist good breathing; for post-operative abdominal and hernia cases; to say nothing of the special needs of head injuries, neurotic and psychotic patients, tuberculous patients, infirm children, etc. There is a great deal of work to be done for each of these groups.

7. The particular apparatus to be employed in the work of rehabilitation, especially the place to be allotted to the use of weights and pulleys; the association of occupational therapy, and its application to the various forms of remedial exercise; the choice of suitable indoor and outdoor recreations and handicrafts, adapted to each type of disability; the place of fatigue in the exercising of traumatized or wasted muscles—all these are examples of other matters requiring careful observation and statistical study.

War conditions have given emergency and Service hospitals a unique opportunity of working out rehabilitation experiments, owing to the fact that in certain of them it is possible to keep patients from the day of injury until they are fit to return to full duty. If each of these centres would concentrate on one of the above problems for research valuable material would be secured on which to base future programmes.

The Grading of Patients

If remedial exercises and other forms of rehabilitation therapy are to be adapted to the stage of recovery it is essential that some form of grading should be introduced and patients regularly allotted to the particular group to which they belong at any particular time. In one emergency hospital in the North of England to which a large rehabilitation department is attached such a system has been in operation for the past year and has proved of great benefit, both to the patients and to the staff. At this particular hospital five grades are recognized, the programme for each of which is as follows:

Grade 1: Bed patients.—Muscular drill. Faradism and massage where indicated. Assisted exercises. Light occupational therapy, mainly of a diversionary character.

Grade 2: Patients just beginning to get up.—Light remedial exercises. Mild team exercises, of short duration, for patients suffering from similar disabilities and in the same grade. Some remedial occupational therapy, where applicable.

Grade 3.—Stronger exercises, with introduction of some mild form of resistance (e.g., weights and pulleys). Cycling for patients with weakened thigh and leg muscles. Remedial occupational therapy. Organized games, carefully chosen in relation to the particular muscles requiring strengthening or the joints needing to be mobilized.

Grade 4.—Increased resistance introduced into all forms of exercise, both individual and team. Longer periods, including some marching. Heavier occupational therapy (e.g., wood-sawing, digging, carpentry, loom work against resistance springs). More strenuous games.

Grade 5.—A hardening course, including cross-country running, jumping, heavy occupational therapy (e.g., wood-splitting, stone-shifting, etc.), and various team games.

One of the chief values attaching to such a system of grading is that every patient is kept strictly under medical supervision, only the doctor having authority to "up-grade" a patient, or to "de-grade" anyone who is reacting unfavourably to the type of course assigned to his particular group.

Organization of a Rehabilitation Team

A full rehabilitation team comprises four distinct groups, which may be briefly described as prescribers, medical supervisors, co-ordinating officers, and technicians. In a small hospital, where patients undergoing rehabilitation are but few, these four groups would be reduced to three or even two; but in larger centres all four will be needed, and the closer the co-operation between them the more effective will be their work.

The group entitled "prescribers" will of course consist of the physicians and surgeons actually in charge of the patients, whose duty it is to signify when rehabilitation should start. In some instances they will prefer to supervise this treatment themselves, but in most cases it will be found far better for the work of medical supervision to be delegated to one or more members of the whole-time medical staff, whose duty it will be to keep an eye on the type of exercise, etc., given to each grade, to assist in the training of the technical staff, to supervise the keeping of accurate progress records and individual graphs, and to examine every patient whose improvement is held up by pain or other unfavourable reactions. Such a supervisor will usually be charged with the responsibility of changing patients' grades, as called for, unless the original prescriber prefers to do this himself.

The task of the "co-ordinating officer" is to see that the various forms of remedial exercise, occupational therapy, or recreational therapy laid down for each grade are correctly given; to arrange the programme of each patient; to note all new prescriptions ordered by the prescriber or medical supervisor, and see that they are put into force; and, generally speaking, to act as liaison officer between the masseuses, physical training instructors, and occupational therapists, welding them into one unified team of rehabilitation workers.

The practice which has been adopted in some hospitals of holding weekly meetings of the whole team, doctors included, at each of which some particular disability is fully discussed, cannot be too highly praised. At such meetings a preliminary talk is usually given on the anatomy of the particular region under consideration and the diseases or injuries likely to interfere with its function; *x*-ray plates and actual clinical cases are demonstrated; and a free discussion follows as to the best form of physiotherapy, remedial exercises, games, and occupational therapy suitable at each stage of progress.

Training of the Rehabilitation Staff

This is another problem demanding careful consideration and planning. Rehabilitation should not be regarded as a combined form of therapy to which masseuses, electrotherapists, physical training experts, and occupational therapists each make their own individual and separate contributions. It is essentially a single process, and should be so conceived. Ideally, therefore, the staff should be trained together in an institution attached to a large rehabilitation centre, and this is probably what will happen after the war. For the present this hardly seems practicable, and the various schools of physiotherapy, occupational therapy, and physical culture are therefore attempting to organize courses in active remedial therapy in addition to those which they have previously been offering. This is certainly a move in the right direction, but it still leaves much to be desired, as each section continues to receive training as a separate unit instead of as part of a single rehabilitation team. Possibly the only way to counteract this tendency during wartime will be by the establishment of special postgraduate classes at the larger and better-equipped rehabilitation centres, which masseuses, physical training instructors, and occupational therapists will all be eligible to attend, and which will qualify them for appointment as recognized rehabilitation technicians.

A very urgent need in connexion with the question of training is the provision of suitable textbooks. A comprehensive volume, describing in detail the various forms of remedial exercise, organized games, and occupational therapy in connexion with rehabilitation, has already been written and should be published in the early autumn; and a valuable handbook on the special remedial exercises suited to each type of disability and to each grade of recovery is now in preparation.

Provision of Essential Facilities

In considering the problem of how to secure the necessary accommodation, apparatus, and trained staff for the carrying out of rehabilitation it must be remembered that, although the war has provided a unique opportunity of undertaking the whole process of rehabilitation at a single centre, as at certain Service

and emergency hospitals, this is but a temporary stroke of fortune. Normally, rehabilitation will more often be carried out in three stages, though this must never be allowed to interfere with the continuity of treatment. These stages are:

(*a*) The period of in-patient treatment, during which the type of rehabilitation therapy described above as Grades 1 and 2 would usually be given.

(*b*) Out-patient treatment following on discharge from the wards.—Where practicable—e.g., where patients are able to attend daily, and to remain not less than half a day for the purpose of remedial exercises, organized remedial games, and occupational therapy—this would ensure the continuity of rehabilitation in the case of patients who can no longer be retained in the wards and for whom suitable accommodation cannot readily be secured in rehabilitation centres. Such cases might be carried through Grades 2 and 3 without involving the hospital in the necessity for providing very elaborate accommodation or equipment.

(*c*) Treatment in a special rehabilitation centre.—Such centres will doubtless be set up after the war—in some cases even during the war—in suitable country surroundings, easily accessible from the towns from which patients are received, and equipped with gymnasium, playing fields, occupational therapy workshops, swimming pool, and other requirements for full rehabilitation therapy at all grades. Such centres should of course be intimately connected with the hospital or hospitals from which patients are received, the patients remaining under constant medical supervision, preferably carried out by the supervisor who initiated their rehabilitation treatment in the hospital at which they were first treated.

It will be seen that under such a scheme as the above, ordinary hospitals which do not carry patients beyond Grade 3 will not need to provide extensive playing fields or occupational workshops. What they will need, however, and what they should set about providing at once, are:

(*a*) A trained staff, keenly interested in active remedial therapy (as opposed to massage, passive movements, radiant heat, etc.) and thoroughly versed in suitable and progressive courses of remedial exercises, games, and occupational therapy.

(*b*) At least one or two masseuses, and, where possible, a physical training instructor and occupational therapist, trained in remedial work, whose whole time is devoted to active rehabilitation.

(*c*) A commodious room adapted for use as a gymnasium, remedial exercises, and indoor remedial games, and fitted up with simple apparatus such as weight-and-pulley circuits, wall bars, pronation and supination machine, wrist rollers, ropes, plinths, and benches.

(*d*) Facilities for providing simple occupational therapy, especially such as is useful for mobilizing stiff fingers, such as basket-work, netting, cane-work, and simple embroidery.

(*e*) A suitable place within or adjoining the hospital grounds for such organized outdoor games as medicine ball, netball, etc.

It must be remembered that, to be thoroughly successful, rehabilitation should occupy best part of a patient's day. It is not enough to arrange for attendance at a course of exercises for a brief period three or four times a week, or even daily, if the rest of the day is left unoccupied. One of the greatest values of rehabilitation is on the psychological side, as the patient's mind gets directed towards his return to full health and he is encouraged to co-operate in the process. For that reason his day should be filled up as fully as possible, not merely with courses of team exercises—his muscles will soon tire if such exercises are continued beyond a half-hour or forty-minute period—but also with other forms of exercise, games, and remedial handicrafts. Very few hospitals yet have the accommodation or staff to provide such facilities for a whole day for any one patient; but all should aim at a full half-day programme for each patient, some attending for morning sessions and the remainder in the afternoon or early evening.

Resettlement in Industry

The task of resettling convalescent patients in employment is obviously not one which devolves primarily on the medical profession, but if the work of rehabilitation is to be carried to its logical and desirable conclusion the collaboration of hospital authorities and of medical supervisors will be essential. This will take the form of advising when a particular patient is fit to return to duty; of indicating whether he can return to his former employment or should be given lighter duties, or, alternatively, whether he should be trained for some different and more suitable vocation; of establishing relations with industrial medical officers in the carrying out of such recommendations; and, where possible, of reviewing the case after return to full work, either by means of medical reports or by actual examination of the patient himself.

In carrying out this essential terminal phase of rehabilitation the assistance of specially trained social workers, attached to hospitals and rehabilitation centres, is of the utmost importance. It is they who should keep track of each patient's attendance at the rehabilitation department, looking up any who are persistently absent. They should receive the medical officer's recommendations as to patients' return to duty. They should keep in intimate touch with employers and arrange for the re-engagement of those fit to start work. They should make contact with the Labour Exchange authorities in relation to cases that require to be trained in one of the vocational training centres established by the Ministry of Labour. Finally, they should be qualified to assist the patient in the intricate problems arising out of the present laws governing workmen's compensation, encouraging him to attempt light duties in spite of the reduction in disability allowance, while at the same time keeping industrial medical officers informed of the condition of each worker returning to work in factory or mine after illness or injury.

Summary

Rehabilitation is defined as the method by which physiological and psychological function are fully restored after their temporary loss from injury or illness.

An organized system of rehabilitation should be regarded as an integral part of the treatment of all debilitating diseases and injuries.

It is essential that it should not be divorced from medical and surgical control, but such dissociation is liable to occur unless its problems are closely studied by the profession and a sound scheme is adopted by all hospital authorities.

As a guide to the formulation of such a scheme a list is suggested of subjects on which further research and statistical study are required.

A system by which patients undergoing rehabilitation are graded according to their stage of recovery is recommended.

The various groups which should constitute a rehabilitation team, and the responsibility devolving on each, are outlined.

The training of the rehabilitation staff, and the provision of the facilities required by hospitals and by special rehabilitation centres, are discussed.

The contribution of rehabilitation medical officers and of hospital social workers towards the resettlement of patients in industry is indicated.

Nova et Vetera

TEACHING OF ANATOMY

Mr. CONNOR BANTRY WHITE of Westminster Hospital Medical School writes: The following extract, taken from an old anatomy book in my possession, shows that the concern felt by teachers of anatomy is by no means recent, and, I think, aptly summarizes the opinions put forward by your correspondents: "The study of Anatomy, as it leads to the knowledge of nature and the art of healing, needs not many tedious descriptions nor minute dissections; what is most worth knowing is soonest learned, and least the subject of disputes; while dividing and describing the parts, more than the knowledge of their uses requires, perplexes the learner and makes the science dry and difficult." This is the first sentence of the preface to the ninth edition of *The Anatomy of the Human Body*, by W. Cheselden, Surgeon to His Majesty's Royal Hospital at Chelsea. His book was printed in London in 1768.

After several refusals to go to the U.S.A., von Helmholtz was persuaded by the German Government to represent German science at the Electrical Congress held in Chicago in 1893. In a letter to Dr. Knapp, announcing the date of his arrival in New York, von Helmholtz, who was then 71, wrote: "I am convinced that America represents the future of civilized humanity and that it includes a vast number of interesting people, while in Europe we see only the approach of chaos or of a world dominated by Russia." Dr. Knapp, who was the recipient of this letter, was the founder of the *Archives of Ophthalmology* and the father of the present chief editor of that journal. ("Purkyne, a Pioneer in Ophthalmoscopy." William Thau. *Arch. Ophthal.*, Chicago, 1942, **27**, 299.)

HAEMOLYTIC TRANSFUSION REACTIONS: THE Rh FACTOR

A memorandum on "The Danger of Haemolytic Transfusion Reactions due to Immunization of the Recipient to the Rh Factor," prepared by the Blood Transfusion Committee of the Medical Research Council, has been circulated by the Ministry of Health to hospitals of the Emergency Medical Service and to all the Maternity Services.

Danger of Reactions due to Immunization to Rh Agglutinogen

It is now known that the red blood cells of the majority of human beings contain a hitherto unrecognized agglutinogen Rh. The term Rh is used because a similar agglutinogen is present in the red blood cells of rhesus monkeys. Approximately 85% of bloods (American white and English), irrespective of ABO group, contain the Rh agglutinogen, and these bloods are called Rh-positive. The remaining 15% of persons (Rh-negative), whose red cells lack the Rh agglutinogen, are liable to form anti-Rh agglutinins if the Rh agglutinogen is introduced into their circulation. This may occur in persons of either sex when Rh-positive blood is transfused, or in a woman who becomes pregnant with a foetus whose blood cells are Rh-positive, the foetus having inherited the Rh agglutinogen from the father. When the father is Rh-positive the foetus is not necessarily Rh-positive, however. The Rh agglutinogen is inherited by a pair of genes Rh and rh, Rh being dominant. When the mother is Rh-negative (genotype rhrh) and the father Rh-positive (genotype RhRh or Rhrh), all the children will be Rh-positive if the father has the gentotype RhRh, but when the father has the genotype Rhrh, each child will have an equal chance of being positive or negative, and there will probably be positive and negative children, although all may be positive or all negative.

A very important aspect of the formation of anti-Rh agglutinins by an Rh-negative person, whether this occurs as a result of pregnancy or of transfusion, lies in the fact that a subsequent transfusion of Rh-positive blood may lead to a severe haemolytic reaction, which may be fatal. Since 85% of bloods are Rh-positive, blood which is selected only on the basis of ABO group compatibility is very likely to prove incompatible in these cases. The only compatible donors are Rh-negative persons of suitable ABO group.

It is of considerable clinical importance to be familiar with the types of case in which the formation of anti-Rh agglutinins should be suspected.

Relation between Iso-immunization of the Mother to the Rh Factor and Erythroblastosis in the Infant

In erythroblastosis foetalis or, to use the more accurate name for the condition, haemolytic disease of the newborn, there is activity of the extramedullary haemopoietic centres (i.e. erythroblastosis) and of the bone marrow, while the peripheral blood shows many nucleated red cells (erythroblastaemia). The use of the term haemolytic disease of the newborn may lead to the confusion of this condition with haemorrhagic disease of the newborn. In the latter condition the common manifestations of melaena and haematemesis are due simply to a deficiency of prothrombin. In haemolytic disease of the newborn, on the other hand, the infant's red cells are broken down by immune agglutinins formed in the mother's circulation during pregnancy. In over 90% of cases the mother is found to be Rh-negative, whereas the father and infant are Rh-positive. During pregnancy the mother produces anti-Rh agglutinins, which pass from the maternal circulation into the foetal circulation and destroy the foetal erythrocytes.

The presence at or shortly after birth of either (*a*) jaundice which rapidly deepens to an intense degree, or (*b*) marked oedema, or (*c*) severe anaemia, has led to the identification of three clinical types of erythroblastosis—icterus gravis, hydrops foetalis, and congenital haemolytic anaemia. While clear-cut examples of these types are easy to recognize, the symptoms of haemolytic disease of the newborn are so variable that diagnosis is sometimes difficult. For instance, at birth the infant may appear to be normal and not develop jaundice or anaemia until later; moreover, the jaundice may never be severe. Again, although a marked degree of erythroblastaemia is frequently present, the number of nucleated red cells varies from time to time and from patient to patient; indeed, at birth there may not be any nucleated red cells in the blood stream, and sometimes erythroblastaemia may not occur in congenital haemolytic anaemia until after recovery has begun. On the other hand, the blood of the healthy newborn full-term child may sometimes contain so many erythroblasts as to appear pathological.

Many infants with haemolytic disease are stillborn, often prematurely, and may be oedematous; nevertheless, as is the case with the full-term child, the stillborn infant may be outwardly normal. When there is no other obvious cause of foetal morbidity, it is probably wise to suspect the existence of erythroblastosis foetalis and assume, for purposes of treatment at least, that the mother has become immunized to the Rh antigen, and therefore to avoid the transfusion of blood, unless known Rh-negative blood of suitable ABO group is available.

There is at present no known method of preventing the occurrence of erythroblastosis, and when a woman has given birth to one affected child, subsequent children are also likely to be affected. The mode of inheritance of the Rh factor should always be borne in mind, however, when giving a prognosis with regard to future children in the families in which Rh is involved, because if a subsequent child is Rh-negative it will be unaffected; for reasons not at present understood, occasionally even subsequent Rh+ children may be unaffected.

Iso-immunization to the Rh Factor following Transfusion

The transfusion, and particularly the repeated transfusion, of Rh-positive blood to Rh-negative recipients of either sex may cause the development of anti-Rh agglutinins in the recipient's circulation and thus lead to the premature destruction of the donor blood cells. At first this process may be entirely silent; alternatively the only evidence of the increased rate of elimination of the transfused blood may be a failure of the recipient's haemoglobin concentration to increase following transfusion. If further transfusions of Rh-positive blood are given, however, the reactions become increasingly severe, the destruction of the donor blood cells is more rapid, and the recipient may become jaundiced or even develop haemoglobinuria. Sometimes no immediate reaction to the transfusion is observed, but the recipient develops oliguria after transfusion and passes into a state of uraemia some days after transfusion. The occurrence of any of these signs, and particularly the increasingly unfavourable response to transfusion, should always suggest the possibility that the recipient has become immunized to the Rh factor, provided of course that the possibility of incompatibility due to faulty ABO grouping has been excluded.

In practice, serious haemolytic transfusion reactions due to the Rh factor are considerably more common in the group of women who become immunized as a result of pregnancy than in the group of persons of both sexes who become immunized as a result of transfusion.

Recommendations

Ideally, Rh-negative persons should be transfused only with Rh-negative blood. At present, however, this ideal may be regarded as impracticable because of the technical difficulties of making Rh grouping tests on a large scale and because of the greater administrative difficulty of keeping a sufficient number of Rh-negative bloods in small blood banks to serve the needs of all Rh-negative recipients.

(1) Mothers of infants which manifest signs of erythroblastosis should not be transfused with blood unless known Rh-negative blood of suitable ABO group is available. In a case of urgency plasma or serum should be used for transfusion.

(2) When transfusions are given to infants affected with erythroblastosis foetalis, blood from a group O Rh-negative donor should be used whenever possible. If no such donor is available, the mother's red cells, if of suitable ABO group, may be used, but the cells must first be washed free from plasma and suspended in physiological saline. When this, too, is impracticable and transfusion is urgent owing to the anaemic state of the child, a donor of group O, taken at random, may have to be used, although it should be realized that such blood will usually be Rh-positive, and that its transfusion may produce a transient jaundice in the infant. In these circumstances it is better to seek a donor among the mother's relatives than to use the father or his relatives. The blood must be introduced intravenously and not intramuscularly, and the transfusion should be given at the earliest possible moment after the diagnosis of haemolytic disease has been made. If previous infants in a family are known to have been affected, the cord blood should be examined for the degree of erythroblastaemia with a view to establishing the diagnosis as early as possible.

(3) Recipients of either sex who, from their response to previous transfusions, are suspected of having become immunized to the Rh factor should receive no further transfusions (unless Rh-negative blood of suitable ABO group is available) until the cause of the unfavourable response to the previous transfusion has been investigated.

(4) Although, when the patient's serum contains anti-Rh agglutinins, it is often possible to select a compatible donor by testing the patient's serum against a number of different bloods of suitable ABO (but unknown Rh) group, reliable results are very difficult to obtain without considerable experience, and it is strongly recommended that this method should not be attempted by persons who lack experience.

(5) In all these circumstances contact should be made as soon as possible with the nearest blood depot or regional transfusion officer. Even when the person suspected of having become immunized to the Rh factor does not require transfusion, it is hoped that contact will be made so that serological tests can be carried out. It is difficult to secure enough serum for testing persons, for only a small proportion of persons who become immunized to the Rh factor develop anti-Rh agglutinins which are of sufficient potency for this

purpose. It is therefore of great importance that clinicians should co-operate by sending samples of blood from their cases for testing, and by persuading those patients who have strong anti-Rh agglutinins to give some of their blood in order to secure a supply of test sera.

(6) When it is discovered that a person has become sensitized to the Rh agglutinogen a statement of this finding should be handed to the person concerned, and she (or he) should be told to carry this statement with her (or his) identity card or blood group card and to show it to her (or his) doctor.

Reports of Societies

FUNCTIONAL DISEASES OF COLON AND RECTUM

A discussion on functional diseases of colon and rectum took place in the Section of Proctology of the Royal Society of Medicine on June 9. Mr. E. T. C. MILLIGAN presided, and the four openers were physicians and psychiatrists.

Sir ARTHUR HURST, after describing the physiology of the colon and rectum, said that the conditioned reflex which led to regular morning defaecation might begin in the education of the infant and develop in such a way that the normal individual as he got older did not think about it at all. The most common cause of what was called constipation, especially in women, was neglect of the normal call to defaecate. If the prompting was not acted upon the muscular wall of the rectum relaxed, and the desire to defaecate disappeared and did not return until the next quantity of faeces passed into the rectum. If there was persistent neglect of the call the rectum became completely relaxed and distended. Well over half the cases of constipation were caused not by any deficiency in the activity of the colon itself but by interference with the reflex. Another large group of people imagined themselves to be constipated when they were not. Many of those who went to the doctor for what they called constipation would say that they had a liquid stool; that for years they had not passed a solid motion. These were the people who had been taking the aperients which figured so largely in the advertisement columns of the newspapers. The symptoms of auto-intoxication were not produced by constipation; they were the result of diarrhoea brought about by aperients. Yet another cause of upset of normal bowel activity was the procedure common some years ago and now revived, known as colon lavage: not the old-fashioned Plombières douche, but successive washings out by one pipe after another, taking perhaps a couple of hours in all, in the vain expectation that eventually clear water would be returned. This procedure ignored the physiological fact that faeces were constantly coming down and mixing with the water. A point to remember was that mucus could only be regarded as significant of a pathological condition if it was present with spontaneous diarrhoea. With a loose stool caused by an aperient it was merely a protective secretion and of no importance. Mucous colitis was an imaginary complaint based on a wrong diagnosis; it was due to the idea that the presence of mucus was itself significant of disease.

The taking of aperients was the commonest cause of the general low abdominal pain associated with spasm. But when such conditions as real ulcerative colitis and diverticulitis were excluded there remained a small number of cases in which colon spasm was the primary thing—a condition corresponding in some respects to asthma, and not easy to diagnose or treat. He warned strongly against *x*-ray examination as a method of diagnosis. Finally Sir Arthur Hurst mentioned paroxysmal proctalgia, first described as rectal crises of non-tabetic origin. The patient at intervals had severe pain, always perineal, not at the anus but apparently three or four inches up the rectum. Usually it went off spontaneously after ten minutes or a quarter of an hour. It was not associated with any particular condition of the bowel, but often with sexual activity. It was almost certainly due to a muscular contraction, probably at the junction of the pelvic colon and rectum. Doctor-patients had obtained relief by having at their bedside an enema syringe and blowing air up the rectum.

The Psychological Approach

Dr. HENRY WILSON, in discussing the effect of temperament upon the colon, pictured two extremes of temperamental type—the jolly, happy-go-lucky individual with external interests, who never thought of his bowels at all, and the highly self-conscious and introspective person with rigid standards for himself and others. When the former had intestinal symptoms, organic disease might be expected; when the latter, no physical disorder apart from over-activity of the central autonomic system. The patient ought to be asked, "How do you think your condition is caused?" If some time were spent in listening to his story and getting a picture of the ordering of his life, it might be found that his symptoms were escapist, or that his central autonomic system was subjected to some strain owing to the emotional rigidity and stress of his life. It was important to remember how the hypochondriac enjoyed the display of the details of his bowel movements. Often he was leading a self-thwarting existence; the interest which the normal individual derived from his family and his work were blocked. In dealing with such a patient the recommendations about lavatory arrangements should be of the shortest and the ritualistic directions about drugs, their times and seasons, should be as simple as possible. As for drugs, barbiturates in quite small doses were preferable because they lessened the tension in many cases in which the autonomic system was too active on account of the patient's general abnormal outlook on life. The encouragement of centrifugal interests among such people was as necessary a part of social medicine as occupational therapy in cases of mental disorder.

Dr. GEOFFREY EVANS said he had been taught by an eminent surgeon many years ago that it was of no use to try to get normal action of the bowels in a constipated person unless the anal margin and canal were structurally intact, and therefore he first of all considered piles and such conditions. After this he was accustomed to give his patients a leaflet containing the principles of treatment of chronic constipation which he had learned from Sir Arthur Hurst. They must learn self-knowledge, self-reverence, and self-control. As for the role of the proctologist, this should include rehabilitation. He should not let his patient go until normal bowel function had been restored—i.e., evacuation of a solid stool with a sense of completion. In the practice of medicine perfection of function was as important as regularity. Incomplete evacuation was a failure of perfection in function such as, in another field, was found in the case of a bladder obstructed by an enlarged prostate. As for bad habits, the worst of these was the early morning rush, leading to neglect of the call for defaecation. Another cause of constipation, not always appreciated, was fatigue. He believed that a number of cases of constipation were congenital. He had seen the condition inherited through at least three generations. Physiological disorders were inheritable just as much as anatomical peculiarities. Another functional disease of the sigmoid was a neurosecretory disorder—a dry sigmoid. He believed that that was the true aetiology of a few cases of ulcerative colitis—a catarrhal sigmoiditis due to the dry sigmoid—the neurosecretory disorder of the sigmoid going on to an ulcerative sigmoiditis and then spreading up the bowel. These were the cases which did well with a wash-out.

The Costive Patient

Dr. E. H. LARKIN said that in cases of persistent pain in the rectum for which no cause could be found psychiatry could often be of assistance. It was necessary for the physician to detach his mind from the local symptoms and to view the patient as a whole. The common characteristic of the chronic costive would be found to be fear. He was always anxious and afraid for himself in general and for his bowels in particular. All chronic costives were neurotics. Psycho-analysis might reveal why the anxiety had become fixed on one sort of symptom in a particular case. An immediate worry might cause pain or disordered function, and a chronic worry chronic pain and dysfunction. One trouble was that while "a lot of people's emotions flowed to their bowels," when they went to a proctologist they had no ready-made language nor any facts of common experience upon which to rely, unlike patients who suffered from, say, some chest complaint. Their minds were

concentrated upon their trouble, but their tongues could not be glib about it. Sometimes the obsession was removed by a quite different adjustment. He cured one case of obstinate constipation by insisting that the patient should get an accountant to straighten out certain difficulties into which he had fallen with the tax authorities. There was no mistaking these afflicted patients—the wrinkling of the forehead, the lustreless eyes, the drooping corners of the mouth, the hunched shoulders, the cold and lifeless hands, the easy loss of temper, the lack of appetite. True depression could be diagnosed in nearly every one of these cases. It was the depression that needed treating, and the treatment was rest, secured by sedatives and reassurance.

The remainder of the discussion resolved itself largely into a recital of personal experiences with particular patients. Mr. LAWRENCE ABEL said that the proctologists who stayed in London during the air bombardment of 1940-1 would have gone out of practice had it not been for "siren diarrhoea." Dr. WESTMANN said that functional diseases of the rectum could be brought into parallel with functional disorders of other organs, especially in the female. Research work in endocrinology should be watched and encouraged. Dr. PARKES WEBER agreed that some printed instructions such as Dr. Geoffrey Evans gave to his patients were likely to be extremely useful, but he would go further and say that it was young, healthy, non-neurotic people who should have the benefit of such instructions. It was such people who were most tempted to neglect the calls of Nature and to draw upon their reserves of mental and bodily health. He believed that paroxysmal proctalgia was merely one form of unstriped muscular spasm in the abdomen. One ought to try to get at its starting-point, which might possibly be an enlarged prostate or some abnormality of the prostate before actual enlargement was reached. Some people were so constituted as to have the potentiality of painful spasm in the abdomen. They were born with it, and it was necessary in each of these cases to try to learn everything possible about it and so to take measures for its prevention or relief.

SCOTTISH DIPHTHERIA IMMUNIZATION CAMPAIGN

At a meeting of the Section of Epidemiology and State Medicine of the Royal Society of Medicine on May 28, with Dr. E. H. R. HARRIES in the chair, Sir ALEXANDER RUSSELL described the organization and results of the Scottish diphtheria immunization campaign, 1941-2. He began by exhibiting a graph showing the diphtheria death rate for Scotland from 1855 to the present year. The enormous death rates of 1862-5 dwarfed all later figures. From 1873 to 1933 the rate had continuously gone down, and since 1933 it had been stationary, except for the epidemic wave of 1940. A large fall in the rate occurred in 1894-7, immediately following the passing of the Notification of Infectious Diseases Act, which made diphtheria and membranous croup optionally notifiable.

The notifications of diphtheria in Scotland, which in 1935 were 11,065, rose to 15,711 in 1940, and fell to 13,586 in 1941, to 10,614 in 1942, and to 2,787 in the first quarter of 1943. The immunization campaign opened at the end of November, 1940 (it should, of course, have opened much earlier in the year). All local authorities were supplied with free issues of toxoids A.P.T. and T.A.F. It is said that with the former toxoid, reactions in the older age groups were more likely to occur, but this form had been used for all age groups, and even in older children had caused few untoward reactions. Only in one instance was the reaction such that the family doctor—who had not given the inoculation—felt impelled to notify the case, quite incorrectly, as acute erysipelas. Among the 745,928 children inoculated in 1941-2 (211,335 pre-school and 534,593 school) there was hardly a case of reaction which gave anxiety to parents or doctors. Eight children in three different areas developed somewhat similar symptoms some time after inoculation with A.P.T. The symptoms consisted of paralysis of certain arm and shoulder muscles and appeared from 14 to 25 days after the second injection of toxoid. Six of the eight children had made a complete or almost complete recovery; the other two were still under treatment.

Effectiveness of Immunization

There had been neither time nor opportunity for carrying out post-Schick tests except locally. In one series of tests at Kilmarnock in over 4,000 children 97.2% of the children of 5 to 10 years and 96.9% of those of 10 and over gave a negative reaction. In Dundee, where the tests were made only two months after the last injection, the percentages of negative responses for the two age groups were respectively 90.4 and 93, while for the children under 5 the percentage was 94.8. From examination of swabs in the case of 796 children in Dundee there was no evidence that an abnormal carrier rate existed among the immunized.

A striking variation had taken place since 1939 in the strain of the organism. Figures for Edinburgh showed that while in 1936 *gravis* infections amounted to less than 10% of the total, in 1939 these accounted for 60 to 70%, and in his 1941 report Sir Alexander Macgregor, M.O.H. for Glasgow, also mentioned the rise in frequency of *gravis* infections. In Dundee the *gravis* type became much more prevalent during the autumn of 1940, and the new type had remained strikingly predominant. It could be said that to-day, over a large part of Scotland, diphtheria was a different malady from that which had prevailed in the past. Another change had been in age incidence, with a marked decrease in the percentage of cases among those aged from 5 to 15, and an equally marked increase among those over 15. It was tempting to suggest that this change of age incidence was associated with mass immunization of the school population, but a somewhat similar change was recorded thirty years ago by Dr. A. K. Chalmers, then M.O.H. for Glasgow.

Mortality Statistics

Turning to mortality statistics, Sir Alexander Russell said that up to the end of March, 1942, it could not be claimed that there had been any remarkable decrease in diphtheria mortality, but a comparison of the figures for succeeding quarters with those for the previous year was instructive:

		Deaths			Deaths
1941	Second quarter ..	117	1942	Second quarter ..	57
	Third quarter ..	88		Third quarter ..	49
	Fourth quarter ..	125		Fourth quarter ..	69
1942	First quarter ..	115	1943	First quarter ..	75

The figures for April and May, 1943, suggested that the total for the second quarter would be even lower than for the second quarter of 1942. The case mortality rates for diphtheria in Scotland, which were 19.9% in 1900, had gradually fallen to 4% in 1931, and had remained at that figure for the following ten years, but in 1942 they had dropped suddenly to 2.75%.

In estimating the results of the immunization campaign it could be said that diphtheria had ceased to be a large public health problem in nearly the whole of Scotland. The problem was now confined to the four large cities and to parts of counties lying in the industrial belt. The immunized school child was eight times and the immunized pre-school child about twenty times less prone to attack than the non-immunized. Among immunized children who did contract diphtheria the infection was almost invariably mild and the complications infrequent. An immunized child was more than one hundred times less likely to die from diphtheria than the non-immunized.

The Situation in England

Dr. J. A. H. BRINCKER added a few remarks on the situation in England. Up to the end of 1942 the number of immunized children according to returns by the local authorities in England and Wales was 3,748,000, which, taking the child population under 15 to be 8,250,000, excluding children under 1 year old, was 45%. He gave reasons for supposing, however, that the real figure was much more like 5,000,000. Certain figures for England and Wales in 1942 suggested that, for every one immunized child who contracted the disease, 5.6 non-immunized children contracted it, and that so far as mortality was concerned the proportion was 1:11. But these figures were far from satisfactory, and the story was very different in particular localities where the medical officer of health had been careful in collecting the facts. In Northamptonshire, for example, for every one immunized child who was notified there were 194 non-immunized children who contracted the disease, and there were no deaths at all among the immunized children.

Correspondence

Conditions for Good Work

SIR,—For the majority of our profession engaged in medical practice our patients leave us little time to think of future standards of remuneration, of pensions, or whether it would be advantageous to crowd the random night calls of a month into one whole night on duty per month. Such reforms don't move the average "medical" much, although they always figure prominently in official publications, and for obvious reasons. There is, however, one constant refrain on the lips of men I meet in practice: "What we want is *conditions that make good work possible*." It was the one longing in peace, and the war has intensified it. Although, of course, it may not always be expressed in those precise words, few will deny that it is the dominant dissatisfaction. This letter stresses the chief barriers to progress.

"Numbers" are the chief obstacle. The panel legislates for a maximum of patients, which, coupled with the relatives of the insured and those of better means, is about twice the number the doctor can treat efficiently. Though incessantly taught during training that "successful treatment consists in diagnosis, diagnosis, and diagnosis," a young doctor finds that practice makes a mockery of the aphorism. At his "surgery" the doctor's one idea is how to dispatch the patient quickly and so get in the other forty or fifty thronging the waiting-room. With such interviews even the shrewdest doctor is bound to err sometimes, for "more things are missed by not looking than by not knowing." This scandal will remain whatever the doctor is paid. The remedy lies not with the Mint but with the medical schools, and it will take many years for them to double the number in our profession and so furnish a decent proportion between doctor and patients. Aggravating the foregoing is the unduly high proportion of trivial complaints. However insignificant, each must be "seen," for a serious malady may lurk among them. The minutes so occupied soon mount up to an hour, and those for whom succour is vital are kept waiting and will miss the deliberation and care they merit. The greatly increased demand for certificates is an even worse abuse of medical talent.

This brings us to the second major grouse. "When the interesting case does arise there is no time to go into it properly." Instead of studying it in detail the doctor temporizes by a bottle of medicine or has to send the patient into hospital and so loses sight of him. The obvious remedy is to copy in the panel sphere the satisfying procedure of private practice. Then the doctor would have plenty of time for full consideration of cases, and would automatically attend special consultations, and be expected to share in treatment if the patient entered hospital. This ensures the continuity of care and interest by the family doctor.

Thirdly, the doctor is thwarted by lack of adequate home help for invalids. This causes vexation and disappointment when the illness is one which is well within his competence to treat. We need a "general practice annexe" to major hospitals for such patients. The general practitioner would continue to be in sole charge; the nursing costs would be shared with the hospital—a mutually economical arrangement; specialist services, should need arise, would be close at hand.

Fourthly, "divided responsibility" breeds discontent. Advice by one doctor at the welfare clinic or in school during the day is apt to conflict with that of the family doctor to whom the parents may resort during that evening. One captain should guide the ship of health. Having sole responsibility and the patient's welfare entirely dependent on him put the doctor on his mettle.

The Government that removes these bad conditions will confer a genuine boon on our profession and an infinite blessing on the sick. Left, they induce a sense of frustration disheartening to those ardently seeking efficiency in a vital national service.—I am, etc.,

Bristol. A. WILFRID ADAMS.

The Government's Proposals

SIR,—The publication of Dr. Grasse's letter (May 29, p. 679) was most opportune. After a careful reading of Dr. Hill's statement of May 16 one is forced to the conclusion that our representatives are not prepared to see the benefits which the Government's proposals offer to both the public and the profession. There is no reason why patients attending a health centre should not see the doctor of their choice provided they attend during his consulting hours, just as it is now possible for a patient to see a particular consultant at a hospital out-patient department. Should treatment be required outside the usual consulting hours it is probable that it would be for an accident or some emergency, in which case prompt attention would be the patient's chief concern. The patient would also have the satisfaction of knowing that there was a doctor readily available at all times. Under the existing system there are partnerships where "free choice of doctor" is present only to a limited extent.

As salaried public servants the profession would probably be more respected. Healthy competition may be a good thing, but there is no sharp dividing line between this and other less ethical methods of maintaining or increasing the income from a practice. The suggested remuneration would appear to be adequate when it is considered that it would be net income and that we should be free from practice expenses, mortgage interest, and capital repayments. Although the salary would mean a reduction of income, it is possible that many practitioners might consider this a reasonable price to pay for freedom from worry. On the other hand, any compromise such as a further extension of N.H.I. would only give us the worst of both worlds. The proposed arrangements should help doctors' wives, two of whom have written to the *Supplement*, as even in peacetime they will, under the present system, continue to live "over the shop"; also to obtain domestic staff will still be a problem. At health centres it would be possible to employ a regular and trained staff for clerical and domestic duties, and a system of shift work could be adopted.

It has been stated that there is some ill-founded optimism regarding the possibility of improving working conditions as there will be no great accession to the ranks of doctors. Surely it would be better to have a definite rota of duties involving more work if it gave us the satisfaction of knowing that there would be some time which we could call our own. As there are men from "single-handed" practices in the Forces who consider that the Government's proposals are being opposed by some older men who are at home in well-established practices, it is to be hoped that all will be given an opportunity to record their wishes before this promising scheme is finally rejected.—I am, etc.,

JOHN V. LAVERICK,
Surgeon Lieutenant, R.N.V.R.

Labour and State Medicine

SIR,—There must somewhere be a fable about a gathering of the animals for the purpose of setting up a community in which it is recognized that each member will have to give up some of his ways in return for the others doing likewise; but all in vain, for none of the delegates would pledge its kind to surrender its predatory habits until all the other animals had done so first.

It is this sort of progress that is contemplated by the writer of the article under the above title (June 19, p. 761) when he suggests to "our would-be political masters" (perhaps forgetting for the moment the strictly non-political attitude of the *Journal*) that "the house should be set in order first, and the people in it fed and clothed properly, before calling in the doctor." If the patient can get well before calling in the doctor, so much the better for the patient, if not for the doctor. But what if he cannot? A state of society which can be set in order before calling in the doctor is one which, *ex hypothesi*, does not need the doctor at all; and, conversely, a state of society in which the doctor plays a necessary part—that is to say, every state of society hitherto known—cannot be set in order without calling in the doctor.

Thus the writer of the article scores what would seem to be a bad point by attributing to the policy of "our would-be

political masters" the very error into which he has fallen himself—that of isolating a single aspect of the programme of reconstruction and treating it as though it were the entire programme itself. In a society in which the relationship of the doctor to his patient changes simultaneously with the relationship of every man's benefits (the doctor's included) to his needs, it will not be true to say that "the doctors will remain the same men" or that "their patients will (in some respects of health and sickness) remain the same men, women, and children."

As to the incentive to work, those many doctors whose impulse to work comes from their enthusiasm for their vocation will not work with the less encouragement because at the health centre they will be provided with the best and most modern equipment and adequate and efficient assistance, an absence of over-strain, and no temptation to waste their time on wealthy imaginary invalids at the expense of the panel queue. Those few who depend for their incentive on financial reward will find their drive in other directions in a world in which what change is left out of the taxes will only buy a very limited amount of comfort and prestige.—I am, etc.,

Great Bookham. RICHARD A. MANCLARK.

Service under a Lay Council

SIR,—Your leading article on June 19 (p. 761) prompts me to put on record one little incident which occurred while I was a member (Independent) of a town council in Scotland (I have been a member of two town councils and two county councils) where there was a large Labour majority. There was a vacancy for a medical officer of health, and I was a member of the selection committee. We met, and, from the 12 to 14 applications received, formed a "short list" of 5 for interview. The first doctor interviewed was the youngest applicant, and he expatiated greatly on his wide experience in the serum treatment of scarlet fever. I may mention here that I maintained strict silence throughout all the interviews. A later candidate was somewhat taken aback when a member of the committee suddenly asked: "Now, doctor, how do you treat your scarlet fevers?" I must confess that at this juncture I gave the doctor a wink, and here I might mention that I knew none of the applicants nor had I ever seen any of them before, although they were aware of the fact that there was a doctor on the selection committee. The wink doubtless disclosed my identity. The question was asked by a man who once upon a time went round the town with a fruit cart and then later became an agent for the Co-operative Insurance Society.

I would not like to have been in the shoes of any of those medical men who, under the present ridiculous system, were forced to answer the questions (many medical) from the lips of this semi-ignorant and semi-illiterate body of councillors. It is evident that the Labour Party desires not only to perpetuate but to extend farcical local government. I suggest a qualifying examination for prospective town and county councillors as a pre-requisite to good local government.

For myself I am prepared to play my part in any State Medical Service enacted by and under the control of the profession, but with the memory of my experience of present-day local government I will oppose to the bitter end any attempt to force me to serve under a town or county council. I authorize you, Sir, to give my name and address to any medical man who desires further information relative to my own experience with lay committees; but at present I hope I may, for obvious reasons, be allowed to sign as—

FORMER COUNCILLOR.

Medicine and Politics

SIR,—Your correspondents who criticize my two articles appear not to realize that science and knowledge are far more important than any political consideration. When German scientists state that psychoneurosis is unknown in the German Army they indicate the subservience of German science to German politics, and are rightly regarded with contempt. Religions and political creeds have often in this way attempted to pervert and to bend scientific truth. To-day's political creeds, of whatever colour, have not suddenly achieved omni-science and intellectual fairness. Knowledge, or science, is greater than nationalism or patriotism, and *a fortiori* is greater than any Government of the day. Still greater is it than capitalism, socialism, Marxism, or any other party belief.

I suspect that my critics are tied to political placentae by party umbilical cords, and they fear any threat to these channels of intellectual nutrition. They are attempting to serve two masters—science and politics—or, by rationalization, have persuaded themselves that politics and science are one and the same thing. I believe that doctors, in order to serve the public adequately, must follow science alone, and must retain the right of independent criticism of all political parties or dogmas. They must serve the public to the best of their ability, but this duty to the politically expressed wishes of the country applies only so long as these wishes do not run counter to accepted scientific principles. The examples of Galileo, Freud, and Einstein illustrate this point.

When Mr. Somerville Hastings (June 19, p. 766) attempts to defend politicians I do not quite know where to take him, for he previously attempted to deny that municipal medical superintendents had power to interfere with the practice of their medical staffs by quoting the L.C.C. rule that the medical superintendent shall "organize and supervise the work of the medical staff of the hospital and be responsible for the due and punctual attendance upon the patients and for the giving of the requisite directions as to their treatment, nursing, and diet by the medical officers, and for the condition of the wards." All my statements regarding the political control of medical officers in the L.C.C. and other municipal hospitals could have equally been confirmed. He says that politicians are as mistrustful of doctors as the latter are of politicians. The mistrust felt by politicians is the fear that ignorance has of knowledge. The mistrust that the medical profession has of politicians is founded upon bitter experience of political theory and practice.

Mr. Hastings regards as "arrant nonsense" my statement that intellectual activities are not encouraged by politicians. I would ask him to look into the question of the municipal achievements in that most important of intellectual activities, education. The classes are universally too big, the teachers are scandalously underpaid, and the percentage of subsequent illiteracy is not negligible. Either the politicians concerned are ignorant, or they are incompetent, or they are dishonest. In any case they can hardly be said to encourage intellectual activity, which is exactly what I affirmed. The same educational conditions exist under Tory or under Socialist control. Therefore, it is not without reason that doctors who desire the best treatment for the greatest number look with some degree of mistrust at the possibility of political control of medical practice.

It is the plain duty of those who disagree with my affirmation that medical science must not be politically controlled either to state frankly that they disagree and that they wish the politicians to run medical affairs or to prove that a State service can be devised in which complete professional freedom may continue to exist.

Dr. Gainsborough's letter (June 12, p. 738) is so full of the "skittle technique"—ascribing to me suppositi'ous statements or opinions, and then bowling them triumphantly down—that I suspect his political feelings have coloured his scientific judgment. I do not understand his oratorical flights or his pharmacological parentheses.—I am, etc.,

London, W.1. GEOFFREY BOURNE.

Psychiatry in General Hospitals

SIR,—The solution of the problem of mental hospital v. neuropsychiatric wards in general hospitals raised by Dr. Dalton Sands (May 22, p. 628) surely lies in the hands of the mental hospitals themselves. It is because, in general, mental hospitals are so deplorably behind the times, housed usually in over-crowded barrack-like buildings which petrify the ideas of the middle of last century, terribly under-staffed in doctors and nurses, that the growth of hospitals like the Sutton Emergency Hospital is at all possible or necessary. The measure of success attained by Dr. Sands is also the measure of the failure of the L.C.C. to adapt its mental hospitals to present-day needs. It is most urgently desirable that mental hospitals throughout the country should wake up in time and make themselves into

pleasant places, utilizing every available method of treatment to a far greater degree than is customary to-day. To achieve this end a number of reforms are necessary:

1. The repeal of the Lunacy Act, 1890, including abolition of the Board of Control.

2. Certification to be entirely medical in character, along the lines of the present temporary certification, with the Courts of Justice exercising oversight to prevent wrong certification.

3. As an early post-war measure the pulling down of all present mental hospitals and their substitution by temporary hospitals consisting of isolated single-story wards, each holding 25 patients at the most. This will be the solution to Dr. Crichton Miller's (?) fundamental issue of the locked gate (June 26, p. 800). Not more than 5% of the patients in any mental hospital to-day need be in locked wards, but because we are condemned to work in out-moded buildings built by our great-grandfathers we still have to keep the majority locked up. Like the stopped window the locked door is, in general, as out of date as the padded room. These temporary hospitals should be built on the edges of the towns they serve and not isolated in the depths of the countryside. They should have a life of about thirty years and should then be pulled down and rebuilt in accordance with the current ideas of the day.

4. All mental defectives should be removed from mental hospitals to suitable institutions. At present far too many of our beds are filled by defectives who seem to have given a little trouble at a colony for mental defectives and consequently promptly certified and sent to a mental hospital for the rest of their days. Institutions for defectives should be "up-graded" and compelled to take *all* types of defectives, including psychotic ones for whom adequate psychiatric treatment in the institution should be available.

The adoption of these reforms would constitute a far more radical solution than would the setting up of neuropsychiatric wards in general hospitals. Dr. Minski (p. 800) cannot have it both ways, and despite his desire not to see mental hospitals used "solely as dumping grounds for the chronic, incurable patient," the widespread adoption of neuropsychiatric wards must inevitably lead to this. What sort of patients would Dr. Minski send to the mental hospitals?

A few other matters raised in the correspondence following Dr. Sands's article call for comment. The question of stigma is not peculiar to mental disease. It is attached to any disease of poor prognosis. Malignant disease, tuberculosis, syphilis, the typhoid carrier state, are all subject to it. Make our mental hospitals the curative places they can become and the stigma attached to them will largely disappear.

Dr. Minski's critical letter is itself open to criticism, especially his reference to the unfortunate use of the word "proved" by Drs. Rees and Shepley. In neither letter is it stated what these modern methods of treatment are supposed to have "proved." Surely "to prove" is a transitive verb. Presumably Drs. Rees and Shepley mean that these methods have proved of value in the treatment of patients in certain mental hospitals. Few people would agree with Dr. Minski that this is a "rather sweeping statement." Obviously the methods are still in the experimental stage and will, we hope, soon be replaced by more kindly ones, but the antithesis made by Dr. Minski is a false one. If Dr. Minski wishes to know why the number of voluntary patients at Warlingham Park is increasing so rapidly I would advise him to visit the hospital. The visit will provide an adequate answer to his question.

Incidentally, the attitude of what one might term the "Maudsley-Tavistock" group towards the orthodox mental hospitals is in itself an interesting psychological, if not a psychiatric, problem. Adler has a word for it, I believe.—I am, etc.,

Joint Counties Mental Hospital, Carmarthen. A. M. SPENCER.

Special Clinics

SIR,—I agree heartily with Dr. R. H. P. Hick's annoyance (June 5, p. 707) with the Family Planning Association for starting yet another kind of special clinic for work which G.P.s ought to do. But it must be admitted that Dr. Joan Malleson (June 19, p. 769) has dealt him a heavy blow in reply. We family doctors, if we are honest, must admit that one factor in the growth of the special clinics has been the disinclination and incompetence of many of us for the kinds of work they do. Let any G.P. who doubts this put it to the test as follows: Revise, if necessary, his knowledge of infant feeding and mothercraft by careful study of one modern textbook, buy some scales, and then start a weekly baby clinic at his own surgery. Within a year not one of the mothers in his practice, whatever her income, will use the infant welfare centre, and—dare I say it?—they will all have finer babies than those who do.—I am, etc.,

Cambridge. H. R. YOUNGMAN.

The Cult of Negative Health

SIR,—The letter of Dr. R. E. Lucas (June 19, p. 766) is opportune. We cannot be reminded too often that the living organism requires, if it is to thrive, an environment sufficiently unfavourable to provide a constant stimulus and challenge. Without this it becomes fat and soft and a prey to disease and decay. In the human being added symptoms are a restless discontent and a seeking after artificial pleasures. The principle applies in all spheres of life, and while it is right to recognize this inner paradox, it would be a pity to ignore the more remote but not less important effects in social organization. Not only has a greatly improved standard of health been accompanied by an increasing tendency to hypochondria, but an equally great improvement in social services and economic security has run parallel with an increased anxiety about the future, with lessened individual self-confidence and self-reliance. This apparent paradox of increased security giving rise to increased anxiety is only comprehensible in the light of the principles on which Dr. Lucas lays stress.

Apart from these general principles we are faced in the years immediately ahead with special problems arising in a generation that has spent its childhood years in the insecurity accompanying evacuation, parental separation, and war conditions generally. It may be confidently anticipated that the childhood insecurity will give rise to consequences demanding exceptional elasticity and adaptability in the social system. Two of such consequences will be a tendency to postulate on the one hand the conditions supposedly causing the sense of inner disquiet, and to demand on the other hand changes in such conditions. Anxiety over ill-health may well be a prominent feature in the picture.

It has been stated that the general practitioner has a vested interest in disease, and that the development of a State Medical Service would solve all our difficulties. But the public health services have thought as much or more in terms of prevention of disease instead of creation of positive health, and have based their appeal, along with the advertisers of patent medicines, upon the people's fear of sickness. The objectives may be beyond criticism; the methods leave much to be desired.

Why is it that "health centre" is already being widely used in connexion with what is little more than an exceptionally well-equipped general practitioner's surgery, more appropriately termed a "sickness clinic"? The healthy have an instinctive and natural antipathy to sickness and the sick, and there is little hope of attracting the fit to a health centre unless health is presented as worth seeking for the joy of living instead of for the avoidance of pain and incapacity. The valuable field work done by the Peckham Pioneer Health Centre seems to be ignored. The evidence presented in the interim report of that centre is invaluable. They noted the danger of persuasion and even of advice. "Individuals, from infants to old people, resent or fail to show any interest in anything initially presented to them through discipline, regulation, or instruction, which is another aspect of authority." And again, in speaking of the individual's reluctance to report sick, "they can and do, however, discuss the difficulty with their health doctor—he is different. . . . We can't stress this psychological fact too much. The fact that the health doctor has no interest in sickness or its treatment is apparently a major contribution to the attitude of the sufferer. The health doctor is in the position of the solicitor, not the barrister. . . . The one will be approached in faith, the other in fear." Here surely is the crux of the matter, and one not easy for doctors, who have, presumably, overcome their instinctive aversion to disease, to understand or assess adequately. A real health centre for positive health will become a practical reality as part of a civic cultural and recreational centre only where the health doctor is one of a team, assisting in the development and maintenance of body and mind at the greatest potential

activity. It must, however, be open to doubt whether the existing training of the medical student equips a doctor to play such a part efficiently.—I am, etc.,

London, W.1. ALAN MABERLY.

SIR,—I hoped and expected that Dr. R. E. Lucas's letter (June 19, p. 766) would have been followed up by others on the same theme by more competent people than myself. May I beg space to put down some of the thoughts that her letter awakes in me?

A little attention will show how many of our daily experiences bear out the thesis put forward by Dr. Lucas. Take the baneful effects of the N.H.I. Acts on doctors and patients alike, both sets of victims witnessing to the degrading effect of the spoon-feeding of the one and the enslavement of the other. All medical men and women who have anything to do with the insured person can testify to the apathy and helplessness of the average specimen, who expects everything to be done for him or her. Consider next the disastrous effects upon the health of both body and mind of women who have practised contraception and the severe limitation of the family. As one who has spent over fifty years in the profession of medicine I say advisedly that the most healthful women in my experience have been those with large families—i.e., those whose path in life was not of the rosiest; they had to "make do," as Dr. Lucas says of the healthy, capable, resourceful, and ingenious countrywoman.

As but a thin partition divides the conscious from the subconscious processes of the organism (for surely all reflex acts must at some time in the evolutionary march have been conscious acts) all those capacities for adjustments of the organism by which it has succeeded in the struggle for survival will surely suffer through lack of use, owing to man's overzealous scientific interference with the interplay of the forces within the organism and those in its environment. A more "jittery" set of psychoneurasthenics than the subjects of six-monthly or yearly anticoryza, or anti-influenza, or anti-pneumonia injections it would be hard to imagine. If Dr. Lucas means something other than this in her fifth paragraph I have misunderstood her, and I would boldly say she ought to mean what I think she does!

The world is filled with the unfit—unfit physically, mentally, and morally—and it would appear to be the aim (and it certainly will be the end) of the planners, Beveridge or other, to add to their numbers. In conclusion I would say that Dr. Lucas's thesis, stated in her second paragraph, deserves the closest attention. What the world needs is a population of educated individuals—not specialists—all of whose "interests, abilities, and energies" are called into play in the process of living.—I am, etc.,

Acton, W.3. A. R. EATES.

Vesalius and Gray on Anatomy

SIR,—There were two related subjects dealt with in recent numbers of the *Journal* which you failed to connect in your interesting leading article. They were the account of Vesalius's *Fabrica* (June 26, p. 795) and the article on the principles of exercise therapy (June 19, p. 747).

Vesalius, you comment, had the conception of the human "fabric" as something at work; it was always living anatomy that he was trying to describe, and the arresting picture of the man walking so gracefully without his skin illustrates it. One has only to look at the picture to see the working of the muscles. The rectus femoris brings the leg forward, the gluteus maximus drags, and then both muscles push the body on in our most frequent movement—walking. Yet in the description of the action of these muscles in my copy of Gray's *Anatomy*, 15th edition, the fact that they are used in walking is not mentioned, and there is certainly no mention of the action of the vastus internus which Mr. Nicoll describes and the recognition of which is of such practical importance.

There has been discussion lately on the teaching of anatomy, and here surely is one of the reforms needed—to return to the conception of Vesalius and teach the anatomy of the skeletal system as living anatomy. Perhaps collaboration of an anatomist and an artist might again be fruitful, and the artist should certainly be Walt Disney.—I am, etc.,

Bury St. Edmunds. S. D. KILNER.

Subcutaneous Emphysema in Small-pox

SIR,—In view of the recent correspondence in your columns on the very rare condition non-surgical subcutaneous emphysema in laryngeal diphtheria, it is worth recording that the complication may also occur in small-pox, a disease not mentioned by Dr. J. D. Rolleston in his letter on the subject (Jan. 23, p. 120).

I noted the complication in 1939 in a Chinese male aged 20 who was suffering from severe confluent small-pox. He was admitted to hospital desperately ill on the 10th day of the disease, with marked stridor and signs at both lung bases suggestive of bilateral collapse. Within 48 hours of admission he had developed marked non-surgical emphysema which extended from the root of the neck to the 4th intercostal space on both sides. As his illness had only lasted 12 days it was improbable that necrosis of laryngeal cartilage had caused the condition, though that diagnosis was tentatively made. The man died on the 14th day of his illness, and necropsy showed a marked laryngeal enanthem, oedema of the glottis, disseminated bronchopneumonic foci in both lower lobes, and a ruptured emphysematous bulla on the surface of the upper lobe of the right lung. Guillot's explanation clearly held good in this case.

I have found no other record of this complication in small-pox.—I am, etc.,

Famagusta, Cyprus. PAUL WILKINSON.

Treatment of Cyclic Vomiting

SIR,—It is probable that the distressing complaint of cyclic vomiting will become more common again among children after the present war as it did after the war of 1914-18. The treatment prescribed in textbooks is not hopeful. For instance, Letheby Tidy in *Synopsis of Medicine* (1939) writes: "During Attack.—Best left alone in dark room. No treatment will end attack." (Duration 1 to 5 or 6 days.) "Enema. Fomentation or mustard leaf to the epigastrium. Ice to suck or hot water. Food not to be pushed, but attempt small frequent drinks of fluids. Salines per rectum *if collapsed*." (Italics are mine.) The following treatment is simple and logical, and I have found it highly effective in one well-marked case. Nothing is given by the mouth; the bowels are opened by enema; thereafter normal saline with bicarbonate and glucose is given per rectum every two hours by means of a 4-oz. rubber bulb. Desiccation is thus prevented and the patient recovers in 48 hours. Oral feeding can be resumed cautiously with lemonade or warm beef-tea. Milk must be avoided. Under these conditions the child does not develop that fear of the complaint which is one of the causes of recurrence.—I am, etc.,

Cambridge. F. H. STEWART.

Adder Bite

SIR,—Flying Officer T. M. Davie's interesting letter on adder bite (June 19, p. 769) is likely to induce others, when confronted with this condition and unable to obtain antivenom, to follow his example of injecting heparin. I should like to point out, however, that injections of heparin are known to produce a condition of increased liability to haemorrhage. As the most striking local effect of adder venom is the production of a "haemorrhagic oedema" due to the escape of lymph and blood from the vessels whose endothelium is damaged by the action of the venom, it is difficult to see how heparin—an anticoagulant—can improve the condition of the bitten limb: theoretically, at least, it might rather be expected to make it worse.

Among the remote effects observed in severe cases of adder bite, bleeding from the lips and gums, haematemesis, and uterine haemorrhage (intermenstrual) have been noted. In the only necropsy report which I have seen diffuse haemorrhages on the brain surface, haemorrhagic oedema of the lungs, and congestion of the kidneys were among the findings; and it was mentioned as noteworthy that "there was no clotting of the blood." This evidence supports the view that it is the haemorrhagic tissue-destroying fraction of the venom that is of importance, and I know of no clinical evidence in support of the idea that intravascular thrombosis—as by a powerful thrombase fraction—is to be reckoned with in human beings bitten by *V. berus*. Venoms of some tropical species—e.g. Russell's viper—are known to contain a powerful thrombase, but argument from analogy of other species is notably unsafe

in the case of snake venoms. In view of the known facts I should therefore feel inclined not only to doubt the efficacy of heparin as a treatment for adder bite but to regard its use as definitely contraindicated. May not Flying Officer Davie's excellent result have been due (1) to the mildness of the case, and (2) to his use of hot kaolin poultices?—I am, etc.,

Hereford. C. W. WALKER.

Aspirin and Gastric Haemorrhage

SIR,—The question of aspirin and gastric haemorrhage as reviewed in Sir Arthur Hurst's letter (June 19, p. 768) raises other relevant aspects of aspirin and its relation to haemorrhage. It would seem possible, in spite of the gastroscopic appearances of the stomach after aspirin ingestion, that the production of haemorrhage may be post-absorptive if comparison and analogy with other aspirin-produced haemorrhages hold true. Thus in three cases of epistaxis seen in a short space of time all were, in my opinion, caused by aspirin, two of them being conclusive. In one of these, a child, subsequent experiment showed that epistaxis could be produced at will by giving aspirin; no evidence of a haemorrhagic tendency could be discovered otherwise. In the other, an adult with hyperpiesia, the information was volunteered by the patient that aspirin taken for headache always caused epistaxis. In the third case aspirin had been given liberally.

Aspirin-taking being such a universal habit it is difficult to get a clear idea as to what extent it does produce a haemorrhagic tendency, but it would seem necessary in all cases of obscure haemorrhage—whether retinal, nasal, gastric, vaginal (including menorrhagia), etc.—to inquire if aspirin has been taken. As aspirin can definitely be a cause of extragastric haemorrhage Sir Arthur Hurst's recommendation that it should be taken in powder form to obviate gastric haemorrhage will be of no benefit, especially should the essential lesion prove to be a capillary defect due to blood-borne aspirin or its compounds.—I am, etc.,

Birmingham. M. HONIGSBERGER, M.R.C.P.

SIR,—In connexion with my letter in your issue of June 19 on aspirin and haematemesis I have been reminded of the gastroscopic observations of Douthwaite and Lintott, which demonstrated that calcium acetylsalicylate showed none of the local irritant action of ordinary aspirin, presumably owing to its ready solubility and consequent rapid dispersion into solution. It can therefore be used without any fear of causing haematemesis.—I am, etc.,

Oxford. ARTHUR HURST.

Stilboestrol for Breast Tumour

SIR,—Following the annotation on cases of prostatic cancer treated with diethylstilboestrol (Nov. 28, p. 641) I should like to record a case of a tumour of the breast similarly treated.

The patient, a woman of 78 years of age, stated that the lump in her breast had been present for at least ten years. She had concealed it and refused all treatment until I saw her at the end of 1942. She was emaciated and bed-ridden. In the upper and outer quadrant of the left breast was an offensive fungating tumour the size of an orange. It bled easily when touched. There were enlarged glands in the axilla. The tumour appeared to be an adenocarcinoma. The patient complained of pain in the region of the left shoulder and up the back of the neck. She also had difficulty in swallowing. She was anaemic: the red corpuscles numbered 3,900,000 per c.mm., the haemoglobin being 50% and poikilocytosis marked.

On Dec. 21 treatment was begun with diethylstilboestrol, 1 mg. three times daily by the mouth. This caused no nausea, but the dose was not regularly taken. Up to the present 250 mg. have been absorbed. On Jan. 13 the tumour appeared to be slightly smaller, and the patient improving in health. On March 20 the tumour was definitely smaller, and covered by a thin layer of epithelial cells. To-day, although she is still anaemic and the ankles are swollen, she feels well and has nearly regained her normal weight. She is up and about at her household duties. She has no pain and no difficulty in swallowing. There is a firmly healed non-adherent scar measuring 3 in. by 1½ in. at the site of the tumour. It is surrounded by a ring of dilated blood vessels. There is some thickening behind the anterior axillary fold, due to some lymphatic glands.

The great interest in the case was the clearly visible tumour, which could be seen during its retrogression. It was unfortunate that microscopical sections could not be obtained, but one felt much indebted to the patient's horror of an operation for an instructive experience.—I am, etc.,

Pitlochry. W. M. BIDEN, M.B.ED.

Economy of Advertising Space

SIR,—Waste of paper and labour results from the repetition of those parts of each advertisement of hospital and public health appointments which could be reduced to a formula. By the co-operation of those advertisers both as regards the date and form of their submissions, a system of classification could be applied, more economical and more immediately intelligible.

Your journal is believed to have such satisfactory relations with other publications as to be able to agree on a matter of this kind, and sufficient strength of character to make it effective in any case in which the need for avoidance of unnecessary waste is not sufficiently appreciated.—I am, etc.,

Chester. D. STENHOUSE STEWART.

Obituary

R. W. BEESLEY, M.D., M.R.C.P.ED.

Dr. Robert William Beesley, for many years one of the leading practitioners in Bolton, died on June 5 after a short illness at the age of 70. His death removes a distinguished personality from the ranks of the local profession. He was known and esteemed by a very wide circle of friends both in this country and abroad. A native of Preston, he was educated at Preston Grammar School and studied medicine at the University of Edinburgh, winning the Buchanan Scholarship and graduating M.B., C.M. with honours in 1894; he took the M.R.C.P.Ed. in 1898, and in the following year won a gold medal for his M.D. thesis. After graduation he served as resident gynaecological physician at the Edinburgh Royal Infirmary and resident physician at the Royal Maternity Hospital. In 1900 he set up in practice at Bolton, and soon afterwards was elected to the honorary staff of the Royal Infirmary, where he had held the post of house-surgeon for some years. When he resigned from the active staff in 1932 on reaching the age limit and was appointed consulting surgeon, the committee recorded its admiration for his great surgical skill and its high appreciation of his splendid work. He was entirely responsible for the first appeal for funds for extension of the hospital in 1919. Dr. Beesley's lucid evidence in Assize and County Courts in connexion with workmen's compensation cases, and also in the coroners' courts, was widely appreciated. He had been a member of the B.M.A. since 1908 and was a Fellow of the Edinburgh Obstetrical Society and the North of England Obstetrical and Gynaecological Society. Outside his professional life he was an enthusiast for the production and use of pure milk, and had three farms where he kept special herds.

Dr. ROBERT REID MCLEAN of Harpurhey, Manchester, died on June 3 at the age of 72. He was a native of Belfast and graduated M.B., B.Ch., B.A.O. of the old Royal University of Ireland in 1897 after studying at Queen's College, Belfast. He had practised in the North Manchester district for over 40 years, in the course of which he built up a very large practice. A colleague writes: Dr. McLean's keenness for work and the enthusiasm with which he kept his medical knowledge up to date were a source of inspiration to his partner and many assistants. Latterly he had been a bitter opponent of State Medicine, and the depth of feeling expressed at his death by his very many patients may be an indication of the ties which bind the general practitioner to those he serves.

By the sudden death of Dr. AUGUSTE BOYES, which occurred at her home on June 4 at the age of 67, Dundee loses a well-known personality. She was the daughter of Thomas Gilchrist Boyes, and graduated M.B., Ch.B. at Glasgow in 1899. Her introduction to Dundee was as resident medical officer in the Eastern (now Maryfield) Hospital. Subsequently she held appointments in Shropshire and Surrey, returning to Dundee in 1919 to succeed a prominent medical woman who was retiring from private practice. Dr. Boyes took a keen interest in both the clinical and administrative sides of medicine, and was a

former vice-president of the local branch of the B.M.A. In addition she was an interested member of the Dundee Burgh Insurance Committee, the Panel Committee, and the Mothers' Welfare Advisory Clinic. Not only patients and colleagues but a wide circle of friends will miss Dr. Boyes, as she was the assistant county controller and assistant county director of the Dundee branch of the Red Cross Society and was a member of the Soroptimist Club, the Women Citizens' Association, the Dundee Art Society, the League of Nations Union, and the Orchestral Society, in all of which she took an active part. Dr. Boyes continued her work and interests until the time of her death, which was her wish. Those who knew her well could not visualize her in an enforced inactivity.

The Services

Temp. Surg. Lieut. J. W. Bringan, R.N.V.R., has been mentioned in dispatches for courage, leadership, and skill.

Surg. Lieut.-Cmdr. J. M. Ridyard, R.N.V.R., has been awarded the Norwegian War Medal for good services with the Royal Norwegian Navy.

Major A. C. Crawford, T.D., and Lieut. J. C. B. Whycherley, R.A.M.C., have been mentioned in recognition of gallant and distinguished services in Malta during the period May 1, 1942, to Oct. 22, 1942.

The following have been mentioned in recognition of gallant and distinguished services in the Middle East during the period May 1, 1942, to Oct. 22, 1942: Brigadiers (temp.) C. Crawford-Jones, C.B.E., and J. Walker, C.B.E., M.C., late R.A.M.C.; Col E. Scott, D.S.O., T.D., late R.A.M.C.; Brigadier (local) J. A. Sinton, V.C., O.B.E., Col. W. H. Kerr, T.D., Col. (acting) L. M. Rowlette, D.S.O., M.C., and Lieut.-Col. D. Crellin, M.C., R.A.M.C.; Majors (temp. Lieut.-Cols.) A. C. Armstrong, D. L. C. Bingham, J. H. Dunn, J. B. George, H. G. Kirwan-Taylor, R. R. Leaning, O.B.E., J. T. Lewis, C. I. N. Morgan, A. N. B. Odbert, D. U. Owen, T. McK. Robb, W. H. Scriven, A. Simpson-Smith, and V. C. Verbi, R.A.M.C.; Major G. M. Curtois, R.A.M.C.; Capts. (temp Majors) J. Amos, J. B. Bamford, H. B. Craigie, W. S. Gale, R. S. Handley, J. M. Henderson, C. R. Lane, N. A. Lawler, R. B. Martin, J. H. Mayer, J. J. McCarthy, J. W. F. Munden, M. W. C. Oldfield, and G. M. Willoughby, R.A.M.C.; Capts. L. J. Blay, J. Brennan, W. R. S. Doll, A. A. Evangelides, A. P. Grant, H. A. Koretz, D. D. Muir, and H. M. Pickard, R.A.M.C.; Majors (temp. Lieut.-Cols.) H. W. Farrell and G. S. N. Hughes, I.M.S.; Capt. (temp. Major) (acting Lieut.-Col.) L. Morgan, I.M.S.; Capts. (temp. Majors) C. H. Bliss and W. J. Young, I.M.S.; Capts. H. Rees and G. R. C. Palmer, I.M.S.; Subadar T. Singh, Jemadur A. F. M. Burhanuddin, and Asst. Surgeon (1st Class) G. T. Wrafter, I.M.D.

CASUALTIES IN THE MEDICAL SERVICES

Wounded.—Capt. J. L. G. Hartley, R.A.M.C., War Subs. Capt. D. F. D. O'Neill, R.A.M.C., Lieut. J. S. Stevenson, R.A.M.C., War Subs. Capt. A. Winder, R.A.M.C.

Prisoner of War.—Capt. A. J. Bailey, R.A.M.C.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

The following candidates have been approved at the examination indicated:

FINAL M.B.—*Part II (Principles and Practice of Physic, Pathology, and Pharmacology):* E. L. Arnold, J. Attenborough, E. H. Back, R. A. J. Baily, H. W. Balme, D. R. Barnes, C. H. Barnett, R. F. Bates, D. L. Bridgewater, W. L. Calnan, D. J. Conway, R. P. Cook, J. Davenport, M. B. Devas, D. H. Drennan, F. H. Epstein, J. W. Fawcett, R. M. Forrester, H. A. Fraser, M. R. Geake, S. R. S. Godkin, R. N. R. Grant, H. C. Gupta, B. Haigh, J. R. Handforth, E. H. Hare, H. Harris, G. Hildick-Smith, J. K. Hinds, P. H. Huggill, E. N. M. Johnston, P. F. Jones, J. O. Laws, J. Lister, J. C. Lloyd, R. E. Loder, C. S. McKendrick, A. L. McLeod, D. H. Makinson, N. M. Mann, P. G. Mann, A. S. Mason, R. G. May, P. H. Mitchell, P. A. G. Monro, W. J. Naunton, T. Norman, J. E. Oliver, W. J. L. Pain, R. A. Peebles Brown, J. S. Pegum, J. M. Potter, J. R. Robinson, K. C. Robinson, P. H. Rogers, L. A. Rook, P. H. Schurr, O. L. S. Scott, K. H. L. Scougall, E. L. Simons, P. S. Smith, I. S. Staddon, T. R. Steen, R. V. Stone, P. R. Swyer, J. D. Trethowan, L. R. Twentyman, G. S. Udall, D. Vérel, B. J. Webb, D. B. B. Whitehouse, E. H. Williams, P. A. O. Wilson, O. H. Wolff, W. D. Wylie. *Women:* S. M. E. Ambache, J. Hardy, M. Sidgwick, G. C. Thompson, A. B. Willcock, A. S. Willis.

At the Congregation on May 22 the degrees of M.B., B.Chir. (not B.Chir. alone, as printed here on June 12) were conferred upon A. W. Capon, G. F. Panton, and F. M. P. Eckstein.

UNIVERSITY OF LONDON

At a meeting of the Senate held on June 23 Prof. Frank Horton, Sc.D., F.R.S., was re-elected Vice-Chancellor for the year 1943-4.

The title of Professor Emeritus of the History of Medicine in the University was conferred on Dr. Charles Singer, F.R.C.P., on his retirement from the Chair of the History of Medicine at University College.

The additional M.B., B.S. Examination to be held in 1944 will begin on Monday, Jan. 31.

The degree of D.Sc. has been conferred upon Miss Emmy Klieneberger of the Lister Institute of Preventive Medicine; Mr. W. T. Russell, a recognized teacher at the London School of Hygiene and Tropical Medicine; and Mr. T. E. Wallis, a Reader at the College of the Pharmaceutical Society.

UNIVERSITY OF GLASGOW

At a graduation ceremony on June 25 the following medical degrees were conferred:

M.D.—[1] Archibald Dick, Hugh Stewart.

[1] With high commendation.

ROYAL COLLEGE OF SURGEONS OF ENGLAND

On July 1 five Fellows were elected into the Council to fill the vacancies caused by the retirement in rotation of Sir Cuthbert Wallace, Bt., and Prof. Seymour Barling, by the death of Mr. L. R. Braithwaite, and by the resignation of Mr. W. Sampson Handley and Sir Hugh Lett, Bt. The following Fellows were elected:

PHILIP HENRY MITCHINER, C.B.E. (St. Thomas's)	508
REGINALD WATSON-JONES (Royal Infirmary, Liverpool)	440
JAMES PATERSON ROSS (St. Bartholomew's)	424
ARTHUR TUDOR EDWARDS (The London and Brompton Hospitals)	417
LAMBERT CHARLES ROGERS (Cardiff)	376

The following were the other candidates:

Seymour Gilbert Barling, C.M.G. (United Hospitals, Birmingham)	375
Lennox Ross Broster, O.B.E. (Charing Cross)	335
Sir Lancelot Edward Barrington-Ward, K.C.V.O. (Great Ormond Street and Royal Northern)	317
John Bowman Hunter, M.C. (King's College)	314
Robert Milnes Walker (Royal Hospital, Wolverhampton)	307
Percival John Moir, M.C. (General Infirmary, Leeds)	288
Arthur Dickson Wright (St. Mary's)	239
Stanford Cade (Westminster)	188

In all 1,190 voted; in addition 20 votes were found to be invalid. Major-Gen. Mitchiner, Mr. Watson-Jones, and Prof. Paterson Ross are all elected for the full period of eight years. Mr. Tudor Edwards is elected as a substitute for seven years and Prof. Lambert Rogers as a substitute for two years.

Medical Notes in Parliament

APPEAL TRIBUNALS

Sir WALTER WOMERSLEY on June 24 moved the second reading of the Pensions Bill, which would give the right of appeal to all who had been refused pensions since the outbreak of war. He said wound cases received pensions almost automatically. The difficulties had arisen in dealing with diseases which had been regarded as constitutional and not aggravated by war service. Such cases had been put before an independent medical expert with specialized knowledge of the disease concerned. That expert was nominated by the President of the Royal College of Surgeons or the President of the Royal College of Physicians. In every case pensions had been granted where these experts decided that the constitutional disease had been aggravated by service in the Forces. The present Bill gave a right of appeal to all appellants who had been refused. There had been pensions appeal tribunals already for those who suffered disabilities arising out of the last war. All those cases had been disposed of.

The principles in those tribunals set up after the last war gave satisfaction. He had modified the conditions of 1919 by which there was no pension if there had been serious negligence or misconduct. Provision had been introduced whereby a modified pension could be granted. The House would agree that there should be an appeal against a reduced award as well as against a refusal of pension. In 1921 an appeal was brought into operation on the final assessment of the degree of a man's disability. He was providing in the Bill for that appeal, but it would not be brought into operation at once because that would be against the interests of the man who might show deterioration over a period up to ten years. As after the last war each tribunal would consist of three persons—in appeals relating to entitlement a lawyer, a doctor, and a layman; in appeals on assessment two doctors and a layman. He had not the right to appoint doctors and had been told by the Secretary of the B.M.A. that there could not be a wide choice. He hoped these doctors would have experience of Service conditions, but that was a matter for the Lord Chancellor.

The right of appeal would extend to all to whom the Ministry had to award or refuse pensions. In the case of decisions given on assessment issues, an appeal would require to be brought within 12 months of the notification of the decision. Procedure of the tribunals would be regulated in England by the Lord Chancellor, in Scotland by the Lord President of the Court of Session, and in Northern Ireland by the Lord Chief Justice.

The tribunals would operate regionally in most cases in such centres as Liverpool, Manchester, Newcastle, Birmingham, and Cardiff. As time went on there would be an extension of tribunals so that no appellant need take a long journey.

Medical Views

Major MANNINGHAM BULLER said the tribunals would find themselves bound, as the Minister was, by the terms of the Royal Warrant. He thought the assistance of a medical assessor was all that was required on a tribunal and that it was unnecessary to provide that a doctor should have a vote. Dr. HADEN GUEST said that while doctors were subject to prejudices, a doctor was always bound to be objective in his judgment on a patient. He thought the provisions of the Bill for obtaining evidence required strengthening. He knew of a case in 1939 where a civilian doctor had been ordered to examine a Territorial battalion of 900 men in two days. When women were first admitted to the A.T.S. instructions were given that they were not to be completely examined. Therefore the records of those women were not complete. At Dunkirk, in Greece, Hong Kong, Malaya, Singapore, and to some extent in Libya there had been loss of medical records. It would be difficult to ascertain the condition of a man at a particular time. There were also cases of fraud. He knew a man with one glass eye who humbugged a medical officer to get into the Army. Sir HENRY MORRIS-JONES thought the Lord Chancellor was the right authority for setting up the tribunals. He hoped the Minister would accept an amendment providing that the qualification of seven years standing should be required for a medical member of a tribunal as for a barrister. Dr. MORGAN said medical men chosen in the way that had been announced would have no knowledge of judicial procedure, workmen's compensation, or social medicine. The list of men chosen by the B.M.A. and submitted to the Minister had been "vetted" by the Chief Medical Officer of the Ministry and by Lord Horder, two persons unqualified to decide. The Royal Colleges were purely examining bodies. The medical personnel at present available were not such as he would choose.

Mr. PALING, replying for the Government, said appellants could bring in any witness so long as there was no question of payment, but if the tribunal decided that specialist evidence should be brought in, the specialist would be paid. The Ministry had endeavoured to get the best people for the tribunals from the medical point of view.

The Bill was read a second time.

Postgraduate Course in Medical Radiology

Mr. MESSER asked Mr. Brown on June 10 whether the students of the only postgraduate course in medical radiology at present operating in this country had protested against the way it was conducted; and whether, in view of the urgent need for radiologists, in civil practice and the Services, he would consider exercising some measure of control over the British Institute of Radiology. Mr. ERNEST BROWN said the method of conducting this course was a matter for the university authorities and was not within his province. The British Institute of Radiology was not responsible for the course, but provided premises and other facilities for lectures arranged on behalf of London University through its special advisory board for the Diploma in Medical Radiology. His officers were discussing with this latter body the arrangements that could be made in the coming academic year to provide postgraduate instruction for suitable students to meet the requirements of civil hospitals and the Services.

Penicillin Clinical Trials Committee

Replying on June 10 to Major LYONS, Sir JOHN ANDERSON said the committee established by the Medical Research Council to organize clinical trials with penicillin was known as the Penicillin Clinical Trials Committee. Its members were: Prof. H. R. Dean (chairman), Dr. A. N. Drury, Prof. A. Fleming, Prof. H. W. Florey, Dr. Percival Hartley, Mr. R. Vaughan Hudson, Dr. C. M. Scott, Dr. J. W. Trevan, Prof. R. V. Christie (secretary), and Prof. L. P. Garrod (assistant secretary). Sir John added that there was consultation between this committee and the committee set up by the Minister of Supply (*Journal*, May 1, p. 553). The latter committee was primarily concerned with production, though it had to take clinical requirements into account. He was satisfied with the active attempts being made to manufacture penicillin. He thought its value had been established.

Tuberculosis Death Rate

In county and borough mental hospitals of England and Wales the death rates from all forms of tuberculosis per 1,000 resident males were: 1938, 4.92; 1939, 5.35; 1940, 7.52; 1941, 12.79; 1942, 13.06. For females they were: 1938, 3.77; 1939, 4.6; 1940, 5.68; 1941, 8.73; 1942, 9.01. For Scotland the comparable death rates were, for males, in 1938, 6.22 in mental hospitals and 2.66 in certified institutions. In 1939 the rates of males were 6.78 and 3.02 respectively; in 1940, 7.61 and 1.48; 1941, 9.11 and 3.43; 1942, 11.08 and 3.38. For females the rates in mental hospitals and certified institutions were: 1938, 6.14 and 1.18; 1939, 6.05 and 3.38; 1940, 6.33 and 1.11; 1941, 6.17 and 3.29; 1942, 9.23 and 4.32.

Hospital and Medical Services in Tunisia

On June 22 Sir FRANCIS FREMANTLE asked the Secretary of State for War if he would give some account of the arrangements and results of the hospital and medical services in Tunisia. Mr. ARTHUR HENDERSON circulated the following reply:

Detailed figures have not yet been received from North Africa, but all reports show that the medical arrangements made were highly successful. The medical services which formed part of the North African Force included certain new units which had not previously been employed on active service. Such, for example, were the field surgical units, which were attached either to main dressings stations of field ambulances or to casualty clearing stations. These units are in effect highly mobile operating teams, designed and fully equipped to function as such in forward areas. Associated with them were the field transfusion units, which have revolutionized the treatment of shock in the field. They conveyed and distributed the large quantities of blood and plasma used throughout the campaign, and together with the field surgical units played a large part in markedly reducing the mortality rate among casualties.

The evacuation of casualties on the whole followed lines which had been found successful in the past, but the evacuation was greatly accelerated by the transport facilities now available. These included ambulance cars, hospital trains improvised from rolling stock available locally, hospital ships, and aircraft. American aircraft evacuated over 16,000 British and American troops. The divisional medical units on occasion handled as many as 400 to 600 casualties a day. The less urgent cases were sent direct to casualty clearing stations, the cases in need of blood transfusion and resuscitation were retained, and the cases requiring immediate operations were dealt with by the field surgical units.

The hospitals in general used to accommodate casualties were general hospitals of 200, 600, and 1,200 beds. The speed with which they opened on new sites and accepted casualties was one of the outstanding features of the campaign from the medical point of view. These hospitals were mainly accommodated in tents, although the administrative parts were often in buildings. Hospitals were provided with the necessary specialist personnel and equipment to deal with cases of all types, including surgical, medical, laryngological, ophthalmological, dermatological, psychiatric, neurosurgical, and maxillofacial cases. Special depots were provided to care for convalescents and for those who were lightly wounded, and to ensure that they were soon fit to return to duty. The general health of the troops and their standard of hygiene remained good throughout the campaign. This was due, at least in part, to the improved education of all ranks and to the better understanding by all of the problems involved.

Pneumoconiosis, Etc.—Schemes were presented to Parliament on June 29 entitled the Coal Mining Industry (Pneumoconiosis) Compensation Scheme, 1943; the Pneumoconiosis (Benefit) Scheme, 1943, and the Silicosis and Asbestosis (Medical Arrangements) Amendment Scheme, 1943; and also the Pneumoconiosis (Medical Fees) Regulations, 1943.

Medical News

Prof. Semon Sarkisov, Vice-President of the Scientific Medical Council of the U.S.S.R. and Director of the Institute of the Brain, Moscow, will speak on Soviet medical workers in the present war at the Royal Society of Medicine, London, on Thursday, July 15, at 5.30 p.m. Visitors will be welcome.

The Nuffield Ulster Provident Association, Ltd., has been launched under guarantee of the Nuffield Provident Fund. The benefits and premiums are identical with those of the Nuffield Provident Schemes in Great Britain and membership is interchangeable on transfer of a member to another locality where such a scheme is in force. The affairs of N.U.P.A., Ltd., are in charge of an elected Council of 16 members under the chairmanship of Mr. D. Lindsay Keir, Vice-Chancellor of Queen's University, Belfast. A survey of the hospital services of Northern Ireland is at present being carried out for the Nuffield Regional Hospitals Council by Lieut.-General Sir W. P. MacArthur, Dr. Duncan G. Leys, and Dr. Stanley Barnes.

The British Association of Scientific Workers has arranged a meeting on Sunday, July 11, at 7 p.m., in the Lecture Theatre of Birkbeck College, Fetter Lane, E.C., in order to demonstrate the importance of the joint efforts of the scientists of the British Commonwealth and the U.S.S.R. It is timed to coincide with a meeting of Soviet scientists in Moscow, and greetings will be exchanged. Chairman, Sir Robert Watson-Watt, F.R.S.; speakers, Prof. J. D. Bernal, F.R.S., Mr. J. G. Crowther, Prof. S. A. Sarkisov, and Sir Alfred Webb-Johnson, P.R.C.S.

Sir StClair Thomson, who died on Jan. 29, left £149,675. Among other bequests are £1,000 each to the Royal Medical Benevolent Fund and the Royal Society of Medicine; £500 each to the Royal College of Physicians, the Royal College of Surgeons, and Epsom College Foundation; and, on the death of his sisters, £4,000 to the Royal Society of Medicine, and £500 each to the Royal College of Physicians and Epsom College Foundation.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* the downward trend of infectious diseases continues: scarlet fever by 280, measles by 252, whooping-cough by 145, diphtheria by 67, and acute pneumonia by 50 cases. Notifications of dysentery were up by 37, of cerebrospinal fever by 9, and of paratyphoid by 6.

The 540 notifications of diphtheria establishes a new low record for this disease. The incidence is unusually large in the North, and the counties of Warwickshire, Lancashire, Yorks West Riding, and Durham contributed 265 cases—practically half of the total for the country.

The fall in incidence of scarlet fever was steepest in Yorks West Riding by 64, London by 51, and in Kent by 38 cases. The only large variation in whooping-cough was the drop of 104 cases in Lancashire.

There were 101 fewer notifications of measles in Staffordshire, 68 in Surrey, 63 in Northamptonshire, and 61 fewer in Buckinghamshire. Among the counties with an increased incidence the most notable were Kent, with 129 additional cases distributed generally, and Norfolk, with an increase of 58, mainly due to a local outbreak in Wayland R.D.

For the third week running an increase has been recorded for dysentery. The fresh outbreaks during the week were in Essex, Saffron Walden U.D., 17; in Berkshire, New Windsor M.B. 10; Cornwall, Bodmin M.B., 8; Somerset, Long Ashton R.D., 7; Lincolnshire, Scunthorpe M.B., 6; 8 further cases were reported from the outbreak in Gloucestershire, Bristol C.B., and 15 more from the two outbreaks in Warwickshire, Birmingham C.B. 9 and Warwick R.D. 6.

Of the 7 cases of typhoid fever 4 occurred in Surrey, Richmond C.B.

In *Scotland* the fall in the incidence of infectious diseases was general, but notifications of scarlet fever were up by 20. Although 79 fewer cases of dysentery were recorded, the disease remains at a fairly high level, with 56 cases (Edinburgh 14, Glasgow 11).

In *Eire* there were slight rises in the notifications of diphtheria, 14, and of scarlet fever, 7. Both diseases are widespread, the largest centres of infection being Dublin C.B., with 18 cases of diphtheria, and Co. Limerick, Newcastle R.D., with 9 cases of scarlet fever.

Quarterly Return for Eire

The birth rate during the March quarter was 22.7 per 1,000 and was 3.3 above the rate for the first quarter of 1942. Infant mortality was 94 per 1,000 births, this being 14 above the rate for the corresponding quarter of 1942. The general death rate was 17.1 per 1,000, being 0.8 above the rate for the first quarter of the preceding year. Deaths from the principal epidemic diseases yielded a rate of 0.7 per 1,000, compared with 0.3 in the first quarter of 1942. Deaths from pulmonary tuberculosis numbered 959, compared with 904, 832, 824, 690, and 673 in the first quarters of the five preceding years: 224 deaths were attributed to other forms of tuberculosis, the same number as that recorded for the preceding year but slightly above the totals for the first quarters of 1939-41. The other most notable increases were those of whooping-cough, diphtheria, and diarrhoea and enteritis under 2 years, for which 93, 94, and 277 deaths were recorded with the averages of 43, 69, and 137 for the five preceding first quarters.

The Week Ending June 26

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,680, whooping-cough 2,330, diphtheria 582, measles 5,774, acute pneumonia 553, cerebrospinal fever 64, dysentery 107, paratyphoid fever 11, typhoid fever 11.

No. 24

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended June 19.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1943 (a)	(b)	(c)	(d)	(e)	1942 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	59	2	27	1	1	104	8	34	2	5
Deaths		1	2				—	1		
Diphtheria	540	28	159	65	25	660	20	138	42	9
Deaths		1	3	—	3	10	—	4		3
Dysentery	164	10	56	—	1	11	5	36	—	—
Deaths								—	—	—
Encephalitis lethargica, acute	2	—	1	—	—	3	—	1	—	—
Deaths		1					1	—		
Erysipelas		—	58	7	3		—	33	6	1
Deaths		—								
Infective enteritis or diarrhoea under 2 years	52	13	9	19 7	5	33	3	13	7	2
Deaths										
Measles	6,472	314	432	27	27	6,629	773	860	80	358
Deaths	1	—	2	—	—	8	3	4	1	2
Ophthalmia neonatorum	78	5	25	—	—	90	5	22		1
Deaths										
Paratyphoid fever	12	1	2	—	—	9	—	3		—
Deaths	—	—	—	—	—	—	—	—		
Pneumonia, influenzal*	587	31	6	—	—	593	28	3	2	14
Deaths (from influenza)	13	—	4	—	—	13	2	—	2	—
Pneumonia, primary			208	14	4			188	24	
Deaths		17		3	10		16		11	6
Polio-encephalitis, acute	—	—				—	—			
Deaths		—					—			
Poliomyelitis, acute	5	1	—		—	5	—	1	—	—
Deaths		—					—	—		
Puerperal fever			17	—	—	—	4	13	1	2
Deaths										
Puerperal pyrexia†	154	15	20	4	2	169	11	16		2
Deaths		—								
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,686	144	251	44	51	1,317	67	239	68	28
Deaths	—	—	—	—	—	—		—	—	1
Small-pox	—	—	—		—	—	—	2		—
Deaths					—				—	—
Typhoid fever	7	—	3	9	—	7	1	2	8	7
Deaths	—	—	—		—	1	—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths					—				—	—
Whooping-cough	1,918	101	210	26	53	1,389	143	37	59	30
Deaths	7	2	5	—	2	4	1	—	4	—
Deaths (0–1 year)	287	40	62	29	29	312	38	63	25	18
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	3,754	486	592	168	130	3,833	529	635	191	136
Annual death rate (per persons living)			13·3	11·0	‡			14·3	12·8	‡
Live births	5,971	748	974	371	317	5,947	672	900	532	206
Annual rate per 1,000 persons living			19·9	24·4	‡			18·6	35·5	‡
Stillbirths	208	22	29			219	18	47		
Rate per 1,000 total births (including stillborn)			29					50		

* Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

† Includes puerperal fever for England and Wales and Eire.

‡ Owing to evacuation schemes and other movements of population, birth and death rates for Northern Ireland are no longer available.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, LONDON, W.C.1.

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B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

ANY QUESTIONS?

Treatment of Unresolved Pneumonia

Q.—*What measures may be adopted to hasten the resolution of an unresolved pneumonia?*

A.—(1) Make sure that the condition is one of unresolved pneumonia and not of empyema. If there is any doubt—and there often is—explore the chest. (2) Do not give any more sulphonamide drugs. (3) Apply heat, either in the form of cataplasma kaolini, renewed every 12 hours, or, if possible, use short-wave therapy. (4) Encourage the patient to take deep breaths to expand the lung for a few minutes every hour. (5) If the general condition of the patient is bad, the temperature low, and the pulse unduly frequent, cardiac and respiratory stimulants are of the greatest importance. Nikethamide 1 c.cm. or leptazol 1 c.cm. should be injected subcutaneously three or four times a day. (6) In asthenic cases in which there is no leucocytosis sodium nucleate, 0.1 g. in 2 c.cm., should be injected intramuscularly twice daily. (7) Antiserum or vaccine treatment is not recommended.

Dystocia Dystrophia

Q.—*Forty-five days after the expected date of birth a Caesarean section was performed on a woman aged 32, and a baby was delivered weighing 12 lb. 8 oz., having great development of adipose tissue, particularly about the upper eyelids. After operation no milk was secreted, and the uterus did not retract very well. The baby died 30 hours after birth, the post-mortem findings being negative. No naked-eye changes were observed in the placenta. The mother made an uninterrupted recovery. Previous to Caesarean section, castor oil and quinine had been given in fruitless attempts to start labour, which even at the time of operation showed no sign of approach. Albumin had appeared in the urine six weeks before the expected date of birth. This cleared up with rest in bed, dieting, and laxatives, but there were recurrences throughout the pregnancy—never more than a trace. Blood pressure varied from 135 to 162 systolic and 70 to 85 diastolic. She once had slight haziness of vision but no visual retinal changes were seen. The pelvic measurements were transverse 4½ in. and antero-posterior 4¼ in. Five weeks before the expected date of birth the foetal position was L.O.A., and the head, though not engaged as firmly as one expects in a primipara, was easily palpable and could be pushed into the pelvis. What treatment should be adopted in any future pregnancy? Should Caesarean section be done at term? Was the prolongation of pregnancy due to lack of pituitary? The mother began to menstruate at the age of 15 and had a 32- to 35-day interval.*

A.—This case presents in a gross degree the features of a syndrome which in recent years has been described in American literature under the term "dystocia dystrophia." Patients presenting this syndrome are usually of heavy build, are relatively infertile, and are especially prone to the late toxaemias of pregnancy. The uterus is insensitive, formation of the lower segment is delayed or disturbed, and the presenting part remains high. Post-mature onset of labour is common, and the labour itself is characterized by incoordinate or feeble uterine contractions with slow dilatation of the cervix. Faults in the shape or size of the bony pelvis are often present, but even in the absence of these the labour is long and difficult and posterior rotation or transverse arrest of the foetal head is common. Foetal mortality is high. The syndrome, in varying degrees, is not uncommon, and as its name implies is believed to be the result of disturbed pituitary function, although definite proof is lacking. No special treatment is of any real value during pregnancy, although the administration of oestrogens in the last few weeks may improve uterine tone and sensitivity. Medical induction usually fails, and quinine is contraindicated in the presence of toxaemia. Mechanical induction should be avoided if the presenting part is high. Treatment in labour should follow the ordinary rules of obstetrics, and should in the early stages be conservative, but if the labour is not progressing satisfactorily then lower-segment Caesarean section is preferable to any difficult vaginal procedure. In the particular case in question the treatment of any subsequent pregnancy should be by Caesarean section one or two weeks before term, or earlier if signs of toxaemia develop and the size of the baby is sufficient to ensure it good prospects for survival. The risks of faulty retraction of the uterus and post-partum haemorrhage would be minimized by operating under local anaesthesia.

Vitamin Requirements

Q.—*What are the current accepted daily adult requirements of the vitamins A, B, C, D, E, and K, expressed in milligrammes and I.U.? How do these requirements vary with age and/or body weight?*

A.—The answer to this question is best given in tabular form.

Age	A		B		C		D		E		K
	I.U.	Mg.	I.U.	Mg.	I.U.	Mg.	I.U.	Mg. of D_3	I.U.	Mg.	Mg.
Adult	5,000		600	1·8	1,500	75	300?–600?*	0·0075–0·015			
Under 1 year ..	1,500		133	0·4	600	30	400–800	0·01–0·02			0·01? for newborn
1–3 years ..	2,000		200	0·6	700	35	400–800	0·01–0·02			
4–6 ,, ..	2,500		266	0·8	1,000	50	3,500 weekly	0·00875 weekly			
7–9 ,, ..	3,500		333	1·0	1,200	60					
10–12 ,, ..	4,500		400	1·2	1,500	75					
Girls 13–15 years	5,000		466	1·4	1,600	80	300?–600?*	0·0075–0·015			
16–20 ,,	5,000		400	1·2	1,600	80					
Boys 13–15 ,,	5,000		532	1·6	1,800	90					
16–20 ,,	5,000		666	2·0	2,000	100					
		Unknown							No international unit	Unknown	Unknown

* It is not certain whether adolescents and adults need an extraneous supply of vitamin D. Enough may be made under the skin by the action of light.

Requirements and Body Weight: Vitamin A.—Requirements directly proportional to body weight and not age. Vitamin B_1.—Requirements depend on caloric intake and not body weight. Vitamin C.—Requirements depend upon degree of body metabolism rather than on actual body weight—e.g. a small person suffering from pyrexia will need more than a larger person who is apyrexial. Vitamin D.—No apparent relation between body weight and requirements.

Complications of Diverticulitis

Q.—*A patient had diverticulitis of the pelvic colon 10 years ago with perforation into the bladder. Colostomy was followed by immediate "functional" closing of the fistula, but flatus was passed occasionally per urethram. A gradually increasing amount of pus (now about 1 oz. daily) is passed, chiefly from lower opening (anus) of lower bowel, latterly becoming bloody. Examination shows B. coli, staphylococci, and non-haemolytic streptococci in the pus. There are no cellular elements suggestive of malignancy. Surgical intervention is not advised. Will any palliative treatment diminish the pus—which may eventually enter the bladder? Sulphonamides in moderate doses for short periods are ineffectual. Are any of the flavines advisable locally? If so, in what form and concentration?*

A.—The pus in this case is probably derived from two sources—one a diverticular abscess and the other a secondary proctitis which is kept up by the constant drainage of pus into the rectum. Although the effect of courses of sulphonamides has not been spectacular, it is advised that these be repeated at intervals (with the usual check on the white cells), ringing the changes on the various products, owing to their specificity of action. Penicillin is not yet generally available, but would be worthy of trial when it becomes so. Flushing the lower segment of the bowel regularly would be advisable, but it is doubtful whether the antiseptic lotions (e.g., 1/1000 acriflavine) have much advantage over plain saline.

Night Sweats and Anxiety

Q.—*Is anything definite known of the underlying aetiology of night sweats? A patient of mine (aged 43) has been troubled with these every night for about six months. He is quite healthy apart from duodenal ulceration. He wakes suddenly about an hour and a half after falling asleep to find himself sweating all over. Immediately he wakes the sweating stops. It is not that he has too many clothes on the bed. He has been troubled similarly at times within the past few years, but the periods were appreciably shorter (7 to 21 days). I can rely on his story, as he is a well-educated intelligent man. He tells me that since boyhood he has been an easy sweater, perspiring profusely when playing games, dancing, etc. All the conditions with which night sweats are associated have been excluded. Incidentally I have seen this condition in men about 40 years old fairly often in the past two years, though the condition did not persist so long. Is there any treatment of help?*

A.—Little is known of the pathogenesis of night sweats. As the questioner says, the complaint is not rare, and slighter disturbances of the same type are commonly met with. Night sweats have been regarded as a cardinal symptom of the anxiety neurosis. In a patient

therefore who is already suffering from one psychosomatic disease, it is most probable that the night sweats are to be explained by a similar mechanism. Inquiry should obviously be made for any sources of anxiety which may be playing a part in the aetiology of both the duodenal ulcer and the sweating. It would also be reasonable to try a zinc oxide and belladonna pill and one of the shorter-acting barbiturates, though the response to treatment is usually not good.

Immunity after Virus Infection

Q.—*Is the solid immunity which so often results from virus infection due to persistent infection? Is it not true that this persistence of infection may actually be detrimental in that it renders the individual more susceptible to reinfection?*

A.—It is known that under experimental conditions clinical recovery from a virus infection may not represent a complete recovery; a residual infection is left which may persist for a considerable time. Such a residual infection would presumably be kept going by the occasional breakdown of an infected cell with the liberation of virus and the infection of a few new cells. The repeated antigenic stimuli so provided would maintain a high antibody level and so a high degree of immunity. One is tempted therefore to conclude that the solid and lasting immunity which is left by so many virus infections is the direct result of persistent infection. The life-long duration of the immunity which is left after recovery from diseases like small-pox or yellow fever makes some hesitate to accept this view because they think it unlikely that the infection with these viruses would persist so long. There is no evidence that persistence of a virus infection renders an individual more prone to reinfection. An apparent exception such as herpes is apparent only since—with the exception of the primary infection, which in the majority of cases occurs in the early years of life—the virus responsible for the attack of herpes is carried by the sufferer.

Allergy to Bee Stings

Q.—*What form of allergy is shown in the following case? A man aged 30 was stung by a bee on the right eyebrow in May, 1942. The swelling subsided in 48 hours. In August, 1942, he was stung again, this time on the first finger, left hand. The right eyebrow as well as the finger were swollen, both subsiding in 48 hours. In May, 1943, he was stung on the left side of the neck. The whole of the left arm was affected, and also the right eyebrow and the neck. All subsided in 48 hours.*

A.—Two characteristic phenomena of allergy are exemplified in the experiences outlined.

(*a*) Persons engaged in certain occupations become sensitized to substances they handle, bees differing from other hazards in that in their case the allergen is injected into the patient and not just applied to the skin or inhaled by the mucous membranes, and so the reaction tends to be primarily of an angioneurotic oedema type. With each sting the patient tends to become a little more sensitive, and with sufficient bites acute allergic shock or even sudden death may occur. The original sensitization in a non-allergic person usually follows a massive exposure or some period of ill-health, worry, or fatigue, conditions in which the body's supply of adrenaline is low. If the patient is already allergic to other substances or a member of a very allergic family, severe reactions arise after fewer exposures and the period of low adrenaline production may not be essential.

(*b*) If serum is prepared, say, from a person allergic to egg, and injected into a site in the skin of a non-allergic person, and the non-allergic person either eats egg or has egg injected parenterally, or if the site in the skin be tested with egg, a localized wheal appears, showing that localization of sensitization does occur even in a non-allergic person. If an allergic person gives a large local reaction to a skin test, say, for dust or pollen, and a course of desensitizing injections is begun, the sites of the previous skin tests frequently swell and itch with each injection, and often each of the sites of the previous injections as well, showing that a greater local sensitivity at certain points is maintained. So in this bee case. Each site of a sting is more highly allergic than other sites, whilst the body develops its general sensitization and so reacts more obviously with each dose of the allergen.

Preventive treatment consists in giving up the bees or in desensitization. For desensitization bee toxin can be used in gradually increasing doses with additions of small amounts of adrenaline to each dose; or a whole bee extract (obtainable from Messrs. C. L. Bencard Ltd., Gorgate Hall, Dereham, Norfolk) can be employed, as experiments have shown that the whole bee extract protects against bees, wasps, and ants.

Invasion of Earwigs

Q.—*What is the most effective insecticide with which to combat an invasion of earwigs?*

A.—Invasions of earwigs in houses seem to be more common in recent years, especially in new housing estates. They favour damp situations, so they are frequently found in bathrooms and recently decorated rooms. One way of discouraging them therefore is to dry out the house so far as is possible. The grounds about the house should be inspected, and rubbish or any articles giving cover for the insects should be removed, as well as kitchen refuse, which would provide them with food. It is difficult to suggest a good insecticide at present owing to demands for more serious pests. If the infestation is very heavy the best measure is fumigation. A light infestation can be cleared up with a good domestic spray (of which there are several on the market) plus extermination of the earwigs in the garden. For the latter the following poison bait has proved effective in extensive American trials: wheat bran (or dried apple pomace) 12 parts; sodium fluosilicate (or sodium fluoride) 1 part; fish oil (or cod-liver, rape seed, or coconut oil) 2 parts. The bran and poison are mixed together and the oil added afterwards; no water should be added. Strew the bait evenly and thinly about the neighbourhood, especially at the base of walls, fences, trees, and telegraph poles.

Toxic Properties of Paradichlorobenzene

Q.—*Paradichlorobenzene is much used to keep away the clothes moth. The other day I was in a house where the airing cupboard contained the hot-water cylinder. The winter blankets were stored here, and there was a liberal sprinkling of the above-named compound, which was vaporized by the heat of the cylinder, and the powerful odour permeated the adjoining bedroom. What would be the probable toxic effects of this vapour?*

A.—While the effects of pure paradichlorobenzene have not been closely investigated, they are regarded as similar to, but more toxic than, those of orthodichlorbenzene, and commercial varieties of each of these compounds contain the other. The acute effects of orthodichlorbenzene are fairly strong narcosis and pronounced irritation of the liver and kidneys; concentrations of 0.1% were lethal to guinea-pigs after 20 hours. According to Sollman several young workers exposed to this vapour for one or two years developed a toxic hepatitis and cataract.

LETTERS, NOTES, ETC.

Sulphanilamide and Mumps

Dr. J. LOWY (London, N.W.1) writes: Many practitioners have found that sulphanilamide is highly effective in the treatment of mumps. In my opinion its use should be limited to adults because of its powerful effect, which hinders the body from gaining immunity, but protects adults from troublesome complications. On the other hand, complications are very rare in children, and they gain life-long immunity if mumps is treated by the customary methods, or not at all. In Czechoslovakia I observed how effective treatment hindered the development of immunity when children treated with diphtheria antitoxin contracted diphtheria in three successive years.

Shortened Puerperium

Dr. G. C. TAYLOR (Peterhead) writes: Mr. Denys Neal Smith (May 22, p. 644) reopens a subject which is of great importance. No hard-and-fast rule can be laid down as to the length of the puerperium, but present-day fashion prescribes longer rest than may be necessary. I have found, as many others have before me, that leg and abdominal exercises in bed from the first day of the puerperium enable the patient to get up usually from the 8th to the 10th day without much difficulty. Many get up to work from the 5th day onward, although this action is usually concealed from the doctor. These leg exercises are the best preventive of that distressing malady white leg. A few weeks ago a 53-year-old woman from a rural district in Scotland consulted me regarding a minor degree of prolapse of the uterus. The patient was very bright and active, full of life and spirits. On inquiry into her history she stated that her mother, now 75 years of age and fit for daily work in the fields, had borne twenty-two children and never spent more than twenty-four hours in bed after labour. The patient, not to be outdone by her mother, had produced twenty-three children, and again twenty-four hours was her period of rest. She told me that she always got up on the 2nd day and performed all her household duties besides some heavy outdoor tasks. It is true that 25% of the progeny did not reach adult life, but that is beside the point. The patient was apparently none the worse for her "ordeals." The history of this case prompts the question: "Are we right in insisting on the 10 to 14 days' rest after normal labour?"

Theophylline for Asthma

Dr. J. F. LANG (Bathgate) writes: In your annotation on theophylline for asthma (June 12, p. 731) you mention the treatment of asthma with this drug by Hermann and Aynesworth as if their observations were the first made on this treatment. I had mentioned the drug at a meeting of the B.M.A. in Glasgow in 1929, and a note of some of my cases was printed in *Clinical Excerpts* in Jan., 1931. It may be worth while for practitioners to remember, while treating intractable cases of whooping-cough where cyanosis and dyspnoea are present, that very small doses of this drug are sometimes effectual for the relief of these distressing symptoms.